THE

ELECTRICAL REVIEW.

VOL. LXXV. SEPTEMBER 11, 1914. No. 1,920.

ELECTRICAL REVIEW.

Vol. LXXV.] CONTENTS: September 11, 1914. [No. 1,920.

	Page
Looking Ahead	353
Wages or Dividends?	355
The New Trade-Mark and Patent Rules	355
Copper	355
Repenting at Leisure	356
The Moratorium—and After	356
The Decline of the Self-Synchronising Motor, by E. P. Hollis	357
Reviews	357
Correspondence—	
Half-Watt Lamp Patents	359
America and Export Trade	359
Deterioration of Red Cable	359
British Association—	
Radiotelegraphic Investigations	359
Gaseous Explosions (*illus.*)	360
Imperial College of Science and Technology	360
War Items	361
Legal	366
Our Legal Query Column	366
Business Notes	367
Notes	371
City Notes	375
Stocks and Shares	376
Electric Tramway and Railway Traffic Returns	376
American Exports of Electrical Goods	377
Large Electrical Smelting Furnaces (*illus.*)	378
Costing, by "Surplus"	381
"Poochees," by C. S. Jeffrey	383
New Patents Applied For, 1914	384
Abstracts of Published Specifications	384
Contractors' Column	Advertisement page xviii

THE ELECTRICAL REVIEW.

Published every FRIDAY, Price 4d.

The Oldest Weekly Electrical Paper. Established 1872.

TO BE OBTAINED BY ORDER FROM ANY NEWSAGENT IN TOWN OR COUNTRY.

OFFICE:—4, LUDGATE HILL, LONDON, E.C.

Telegraphic Address: "AGEEKAY, LONDON." Code, A B C.

Telephone Nos.: Holborn 933; Central 4425 (Editorial only).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

Subscription Rates.—Per annum, postage inclusive, in Great Britain, 1l. 5s. 6d.; Canada, £1 1s. 8d. ($5.30). To all other countries, £1 10s.

FOREIGN AGENTS:

ADELAIDE: Messrs. Atkinson & Co., Gresham Street.
AUCKLAND, N.Z: Gordon & Gotch, Albert Street; The Mining and Engineering Review, 31a, Strand Arcade, Queen Street.
BERLIN: Asher & Co., Unter den Linden; Speyer & Peters, Unter den Linden 43, N.W. 7.
BRISBANE: Gordon & Gotch, Queen St.
CHRISTCHURCH, N.Z.: Gordon and Gotch, Manchester Street.
DUNEDIN, N.Z.: Gordon & Gotch, Princes Street.
JOHANNESBURG, CAPETOWN, BLOEMFONTEIN, DURBAN, PORT ELIZABETH, &c.: Central News Agency, Ltd.
LAUNCESTON: Gordon & Gotch, Cimitiere Street.
MELBOURNE: The Mining & Engineering Review, 90, William Street; Gordon & Gotch, Queen Street.
MILAN: Fratelli Treves.
NEW YORK: D. Van Nostrand, 23, Park Place.
PARIS: Boyveau & Chevillet, 22, Rue de la Banque.
PERTH, W.A.: Gordon & Gotch, William Street.
ROME: Loescher & Co., Corso Umberto 1° 307.
SYDNEY: The Mining & Engineering Review, 273, George Street; Gordon and Gotch, Pitt Street.
TORONTO, ONT.: Wm. Dawson & Sons, Ltd., Manning Chambers; Gordon and Gotch, 132, Bay Street.
WELLINGTON, N.Z. Gordon & Gotch, Cuba Street.

Chquees and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, and crossed "London City and Midland Bank, Newgate Street Branch."

THE UNIVERSAL ELECTRICAL DIRECTORY

(J. A. Berly's).

1914 EDITION

H. ALABASTER, GATEHOUSE & CO.,

4, Ludgate Hill, London, E.C.

LOOKING AHEAD.

IT has required nothing less than the most terrible war that Europe has ever witnessed to lead some of our contemporaries, lay and technical, to worry their heads about the extent and character of Germany's foreign trade connections and the need for strong British action in order to deal properly with the menace. Suddenly it has dawned upon the various writers that there is a chance to capture Germany's export trade, and when writers who know everything in general and nothing in particular adopt such a view, they are apt to become obsessed with the idea that this capturing is no sooner said than done, or that, at any rate, it is comparatively easy to wrest from our Teutonic enemies the many millions of pounds' worth of business that they have by their own methods, and with most careful nursing, secured from different markets.

It will be a matter for everlasting regret if we are going to be satisfied with airy utterances from men who are overwhelmed by the sight of figures in millions, and whose only qualification to write on things in general lies in their lack of specialised knowledge. We venture also to suggest that it will be to our discredit if we thoughtlessly imagine that we are going to succeed in capturing German trade by giving vent to feelings of anger and malice. The electrical and engineering manufacturer or trader will be able to deal more effectively with the position by freeing himself both from the excessive optimism of the uninitiated and from the erratic policies of men in haste and anger.

Every man of the "Bull-Dog Breed" has felt his blood boil as he has heard of the barbaric practices which have been adopted by the so-called "cultured" nation in its war upon higher civilisation. It has been staggering all humanity by its onward downhill course of militarism. Our outraged feelings refuse to be silenced, and they justify a demand for vengeance upon the perpetrators; so far, all of us are to be excused if we express in anger our determination to stop at nothing in order to bring about the utter confusion of our adversaries. But we do well to inquire whether in our discussions on capturing trade we are quite maintaining that reputation for coolness and stolidity that our representative, Mr. T. Atkins, is displaying on the field of battle. When we get actually down to the details of the trade war, and proceed with the execution of the very well thought-out plan of campaign that is essential, we shall probably talk less and *do* more. No doubt, talk of the order that we have so far witnessed has formed one of the preliminaries to the adoption of a proper plan of campaign. Perhaps now it will be as well if we set about the very deep thinking and planning and organisation that have to follow before any plan of campaign can be proceeded with, with reasonable hope of either immediate or ultimate successful execution.

First of all we may safely accept it that the present revulsion of feeling against manufactures made in Germany

will continue in the British Empire and in many other countries long after the sound of cannon has ceased to be heard. Sentiment will, in this case, very largely affect the course of business. This will be a most valuable power inevitably working in our favour as manufacturers for the home market, and as exporters, too. The question of price, instead of being a prime factor, will become a consideration of secondary importance, and will continue so for some time. But there may be lines into which the question of price cannot enter. For some things German that we have depended upon in the past we shall, where possible, substitute other things British. Ultimately, however, it may happen that necessity will influence the direction of orders for specialities, and price will have again to be reckoned with.

Further, scientific achievement is superior to military conquest, for, as has been pointed out again and again, science is international, though scientists individually have to take arms nationally against each other. It is both sad and ludicrous to observe the cordial fraternisation of scientists internationally the while they are as nationalists doing their utmost to invent means whereby they may the more effectually annihilate each other. The pen indeed *is* mightier than the sword! We take it that British electrical engineers and scientists are prepared now, as ever, to give credit to the men and firms of Germany who have produced inventions and made discoveries which have advanced the science and applications of electricity.

In addition to the very helpful influence that British trade must most assuredly receive from the new Home sentiment, and the improved business relations that as far as we can see are bound to follow between ourselves and other countries as the result of comradeship in arms, we are justified in accepting the statement that Germany by her own deliberate attack has, as stated in one of the daily papers, "smashed her own trade to atoms." It may be true that those engaged in the peaceful occupations of commerce and industry were not responsible for the madness of German militarism; but there has long been a suspicion of very close relationship between some leading German industries and the powers in authority, and our own pages have repeatedly borne witness to the fact that in her commercial competitive methods, whether here or in foreign parts, there has been an unscrupulousness and a hitting below the belt which have not much more to commend them than have overhead attacks on defenceless non-combatants or under-water mine-laying for the dispersal of those whom you are not plucky enough to come and fight fairly in the open. The subsidising of Press world-wide agencies and newspapers to sway public opinion in favour of German national policy is only a reminder of some of the deeply-laid Press schemes with which, as revealed in our pages at the time, it was sought by German firms to create opinion favourable to German manufactures and trading schemes.

We published not a great while ago a copy of a letter sent privately by one of the huge German electrical organisations to an electric central-station engineer in China, which showed the inducements that they were willing to offer in order to secure a footing. British engineering and electrical firms will have a very real sympathy with the intentions of our gallant Japanese allies to allow themselves no rest until they have completely extirpated German commercial influence from China. Clearly wherever German commercialism has been displaying itself in the markets abroad, it has been marked with the same overbearing "Will-to-power," over-weening ambition to remove, by hook or by crook, all others from its path. But its present attempt to get all Europe under its heel with its toe ultimately reaching across the broad Atlantic to the States and Canada, will be its own undoing in the Far East as well for many a day.

Yet in our deprecation of all that is so unworthy in German methods we shall be foolish indeed if we pretend that there have not been some very good and commendable reasons why success has practically everywhere attended our enemies' efforts at commercial expansion. We shall do well if we calmly, and as dispassionately as may be in the present atmosphere, analyse the reasons for that success, and take advantage of the advice and criticism that have being so freely offered by our own representatives. We forbear at this moment reiterating all those old and almost musty criticisms—British firms know them only too well. Yet, while in a trading sense, at any rate, our rivals lie *hors de combat*, we ought to rise to the occasion. What steps are we taking to do so? Many firms have, no doubt, been turning over in their own minds whether they can manufacture this or that new line, for which hitherto we have placed too great a dependence on foreign sources. We hope that they will not too easily dismiss such lines as impossible. Of course, much must depend upon the time the war is to last, but whether it end soon or late, the fact remains that disorganised German and Austrian electrical factories, when they try to get to work again, gathering together such parts as remain of their broken staffs, will find themselves in a very different position from that which obtained when the war broke out. We need not labour this point; German industry cannot pull itself together and get into its stride again for many a year to come, and as to German credit and finance, who can predict the position in this connection, and what the effect upon industry may be? We cannot help feeling that fear of an early resumption of German cut-throat electrical competition should not deter from enterprising action any manufacturers who are considering whether they will embark upon new ventures, extend existing departments and open new ones, laying out capital expenditure, and undertaking the manufacture of articles which will be needed by the United Kingdom and the Colonies, by France, by Belgium, by Russia, and by the other great purchasing nations now at war.

A financial daily prints the fears of a Mr. Faintheart, who hesitates to lay out new capital in capturing German trade. He fears to install the necessary machinery, because to compete with Germany he would have to make cheap and inferior goods, would have Germany strongly up against him after the war, because she can manufacture so cheaply, &c., rendering his capital outlay useless. Well, to him who hesitates in this connection the opportunity is lost. We sincerely hope that this attitude will not be assumed by electrical firms, for we are profoundly convinced that in many cases when the position is properly understood the venture will be found worth making.

Let it be remembered that this storming of the citadel of German trade by the guns of German militarism has come at a very important juncture in the electrification of the world. Russia has done little more than scrape the surface

of her soil, has but touched a thousandth part of her electrical possibilities. Where will she be likely to go after this for electrical requirements? Who said Germany? As has been said of late, perhaps we have so far known less of Russia than of our other Allies, but the last few weeks have led us to wonder whether when that great nation begins to move enterprisingly along electrification roads, the vast Empire will not make a most magnificent market. We merely use Russia here as one instance, among many which could be advanced, to support our suggestion of the timelinses of this German industrial *débâcle*, and how it may be made to redound to the mutual advantage of Britain and her Allies when the final issues on the field and on the sea are decided. In all these recent doings Germany has sown for her own commercial craft mines which she will find it difficult with all her manœuvring diplomacy to catch by trawling.

The moral of the situation, so far as we can deal with it just now, seems to us to be as follows:—There has been enough of general talking, and the time has arrived for British electrical firms and engineers both individually and in co-operation, to resolve to do something, in their own particular sections, to "capture" German electrical trade. We have done our best to put the facts of the position forward in several recent issues, and we have for years past stated the directions where our procedure has shown shortcomings and wherein our rivals have gained advantages. A willingness to take trouble, to adapt ourselves to the buyers' requirements instead of trying to compel him to change *his* ways for *our* benefit, to make cheaper as well as better quality lines in some goods, to organise our foreign service in the most efficient manner possible (a point on which German trade has notably won much success) and a determination to keep ourselves constantly in evidence—these are some of the essentials called for. At the base of all our new operations there lies of necessity the financial need. New capital will be required for industry. Will the banks help us more than they have done? We hear that they are considering the matter, taking different industries in turn. If that be so, we will hope that when the electrical trade position is studied the possibilities will be weighed in detail and that the question of assistance will not be dismissed after a merely general glance at the matter.

Wages or Dividends?

We publish elsewhere in this issue a collection of interesting letters on the subject of German shareholding in British electrical businesses. We commend the views expressed to the serious thought of all our readers, confident that when the matter has been considered in all its bearings, a conclusion will be arrived at favourable to the uninterrupted employment of British workmen and workwomen, adequate safeguards as to profits being adopted by the Government. In the past it has been a grievance that London financiers and investors found the money for German manufacturers to fulfil the Victoria Falls contract. We took the risks—Germany did the work. Now some of our correspondents are protesting against German capital coming into this country to keep manufactories in operation, paying many thousands of pounds in wages every year, perhaps ten or twenty times the amount earned in dividends or interest for those who hold the paper. Sometimes part of the capital involved in these works is even lent by British bankers, and is not German at all.

From the point of view of industrial activity, taking that alone at the moment, we cannot help feeling that some of the evening newspapers, led by certain politicians, have laid themselves open to a charge of excess of zeal, which is calculated to do harm to legitimate British industries. The Government has seen to it that profits shall not go out of the country during the war at any rate. Let us be careful lest, in attacking German capitalists and investors, we do not do untold harm to hundreds of thousands of Englishmen and their dependants. The national or public opinion in this connection is, we think, reflected in the letter from the Chief Constable of Stafford, which we reprint elsewhere to-day.

The New Trade-Mark and Patent Rules.

It was inevitable that upon the outbreak of a European war attention would have to be paid to the Patents and Trade-Marks Acts in so far as they affect the belligerent parties. Many Germans own patents and have registered trade-marks in England, and the question at once arose whether they should continue to enjoy the same rights as in the piping times of peace.

The first of the Patents, Designs and Trade Marks (Temporary) Rules, 1914, provides that the Board may on the application of any person, and subject to such terms and conditions, if any, as they may think fit, order the avoidance or suspension, in whole or in part, of any patent or licence granted to a subject of any State at war with His Majesty, and the Board, before granting any such application, may require to be satisfied on the following heads:—(*a*) That the patentee or licensee is the subject of a State at war with His Majesty; (*b*) That the person applying intends to manufacture, or cause to be manufactured, the patented article, or to carry on, or cause to be carried on, the patented process; (*c*) That it is in the general interests of the country, or of a section of the community, or of a trade, that such article should be manufactured, or such process carried on as aforesaid.

With the principle which underlies both these sets of rules, we have no reason to quarrel. We may be fairly sure that our German enemies have not been slow to take full advantage of all the patents owned by Englishmen in the happy Fatherland. The new patent rule is fairly easy to understand. It practically throws a German patent open to the British public. The effect of the new Trade-mark Rule is not so easy to comprehend. Does it not, in effect, legalise the use of a false trade-mark? Suppose, for instance, a subject of the Kaiser had registered a brand of metallic-filament lamps under the trade-mark "Teufel Lichte." Is it to be open to any subject of the King to make similar lamps and attach this trade-mark to them? If so, it may be that the public will be defrauded. Buying Teufel Lichte in the market, the ordinary purchaser who wants a German article, notwithstanding the war, might be misled. It seems as if we shall have to wait for some decision of the Courts before being able to say with certainty what the new rules really portend.

Copper.

The appearance of the copper statistics for the end of August was quite unexpected, and the figures as issued are manifestly incomplete, owing to the impossibility of ascertaining the position of stocks on the Continent. Meantime, however, the returns were appreciated, though they show hardly any change during the month. The stocks in Havre, Rotterdam, Hamburg, and Bremen, are recorded as nominally unaltered on the month, and the total visible supply in Europe on this basis amounts to 34,806 tons, compared with 33,612 tons at the end of July, and 34,045 tons a year ago. The stocks of standard copper were 16,081 tons, compared with 16,003 tons on July 31st. There was a very notable diminution in the supplies coming forward, which for the entire month only amounted to 26,623 tons, while there was an equally notable diminution in the deliveries, which stood at 25,429 tons. With trading on the Metal Exchange still in a state of suspension, there is practically a deadlock in the standard copper market, but a certain amount of business is being put through from day to day on private terms. The dealings are, however, very restricted, and business is exceedingly difficult, and, indeed, becomes more so. On the other hand, there is more doing in actual copper, refined and so forth, for which demands are

manifesting themselves—not to any great extent certainly, but in a measure which seems to suggest that a gradual restoration of confidence is occurring amongst the consuming trades. That consumption has been checked by the war goes without saying. It is impossible for tens of thousands of men to be called to the colours without the available working forces in the industrial establishments suffering, and a restriction of consumption in this direction is, therefore, inevitable. On the other hand, there are one or two branches where special activity is to be observed, these being the brass and ammunition works. The former have taken large quantities of copper and spelter for the production of brass for cartridge strip, and the latter are working night and day in the endeavours to provide ample reserves for the destruction of the hordes of barbarians who are murdering non-combatant men and women and children and their own and our wounded, and who call this "war." It is in the destructive ends of the metal trades that the greatest animation is shown to-day, the arts of peace being temporarily relegated into the background. For the former there is no doubt that the present very greatly curtailed output of the world's mines and smelters is amply sufficient. Following upon the war, the United States mines and smelters have reduced their output by fully 50 per cent., and the process is being carried even further by a number of works, many of which have now closed down entirely. This restriction of the supply of copper is bound to have the effect later on of stimulating prices, but for the time being there is all the metal about which is wanted, and the tendency of prices within the last week or two has been towards a lower level. If a seller comes along and wants money for his copper, the sale resulting is made at what looks like being a very cheap figure. On the other hand, when a buyer wants a certain brand, or a certain description of copper which is scarce, he has, when he finds a seller, to pay up smartly for it. Under such conditions it is difficult to say exactly what the market price is, but probably from £58 to £60 for electrolytic covers most brands and specifications.

Repenting at Leisure.

Everybody is wanting to help in these days, and those who have no better way of occupying their time are writing "letters to the editor." Such an opening of the floodgates has there been—everybody's doing it! May good emerge as a result of some of the suggestions, criticisms, and so forth. We sympathise deeply with the editors of daily papers at this time, and in turn we invite our readers to extend their kindly sympathy to us in our own tribulations. No doubt there is much to be said in favour of an occasional outburst as a relief for our over-heated temperaments. Blood-letting was a good old remedy—would that we could apply it just now to some of our friends. It is a mistake to write an angry or unreasonable letter over-night, and hasten out to catch the midnight collection with it. It would be so much better to leave the posting until the morning. The writing of the letter has relieved somewhat, sleep has done the rest, and with the dawn has come repentance. How many are the missives that have been destroyed after further and calmer consideration! We never like rejecting correspondence when it bears on matters of interest to the electrical fraternity, but occasionally it devolves upon us to exercise the maturer thought that we are sure the writer would have exercised himself if he had still the opportunity. Sometimes he does use the opportunity, and after letters are in type we are asked to suppress them. It would be so much more convenient for us if the writer would send us a covering letter asking us to do so.

Associations, too, have occasionally been known to act with undue expedition, and inasmuch as associations are made up of individual members, and many individuals at the present time are affected by the war-like atmosphere so that urgency gets the better of the reasoning faculties, it is not perhaps a matter of surprise that some things are done over-night that might be better done if left until the morning.

THE MORATORIUM—AND AFTER.

[from a legal contributor.]

The lawyer returning from his holidays finds himself confronted with a new and extraordinary situation. Contracts innumerable, the sanctity of which has been instilled into him from his legal cradle, are being broken with impunity—nay, more, they are being broken by virtue of a Royal Proclamation under statutory authority. He reads that debts incurred prior to a certain time may not be enforced until after a certain time. Incidentally, he realises that his business, in so far as it consists of the gentle art of debt collecting, must be suspended for a considerable period.

This state of affairs is puzzling even to the lawyer; and if the legal fraternity find it difficult to comprehend, how much more must the layman fail to grasp its full meaning?

Reading the moratorium proclamation, together with the various amendments which have been made in it quite shortly, it amounts to this that all payments which became due before September 3rd, 1914, or which will become due on any day before October 4th in respect of any contract made before August 4th, shall be deemed to be due and payable on a day one calendar month after the day on which payment originally became due, or on October 4th, whichever is the later date, instead of on the day on which payment originally became due.

For the sake of simplicity, we have omitted references to bills of exchange and cheques.

Payments so postponed shall, if not otherwise carrying interest, and if specific demand is made for payment, and payment is refused, carry interest until payment as from August 4th, 1914, if they become due and payable before that day, and as from the date on which they become due and payable if they become due and payable on or after that day at the Bank of England rate.

Certain payments are excepted from the operation of the moratorium, viz. (1) any payment in respect of wages or salary; (2) any payment in respect of a liability which, when incurred, did not exceed £5 in amount; (3) rates and taxes; (4) any payment in respect of maritime freight; (5) any payment from a person or firm resident outside the British Islands, unless such person or firm has a branch business establishment in the British Islands; (6) any payment in respect of any dividend payable in respect of trustee stocks; (7) any liability of a bank of issue in respect of bank notes issued by that bank; (8) any payment by, or on behalf of, the Government; (9) any payment under the National Insurance Act; (10) any payment under the Workmen's Compensation Act; (11) any payment in respect of the withdrawal of a deposit by a depositor in a trustee savings bank.

Let us see what the effect of this delay in payments is in the commercial world so far as electrical people are concerned. In the first place, it clearly applies to *rent*. Rent due under a lease for any sum over £20 a year cannot be recovered until the moratorium expires. For instance, suppose £10 is due for rent at the Midsummer quarter day under a lease granted before August 4th cannot be claimed until October 30th. Distress, however, might be levied before that time. It is conceived, however, that when the lease was for £20 a year or under, payable by four quarterly instalments, such instalments are not affected by the moratorium. This view is put forward with some hesitation, because when a man takes a lease for years at £20, he incurs a liability *in futuro* for more than £5.

With regard to goods sold and delivered prior to August 4th, the price cannot be recovered until October 4th, if it is more than £5. Where, however, a customer has had a trading account with a firm which allows him credit, and his bill amounts to, say, £49 6s. 3d., made up of different items in respect of goods ordered and delivered on various dates prior to August 4th, it is conceived that while the items over £5 could be sued for and recovered notwithstanding the moratorium, those under that amount could not be recovered. Each purchase must be regarded as a different transaction.

It will be observed that gas and electric lighting charges are not excepted. They cannot be said to come under the

head of rates and taxes. As such charges in so far as they relate to gas and electricity supplied before August 4th do not become due until October 4th, it is conceived that an authority could not cut off the supply, and by that means enforce payment, until after that date.

It is satisfactory to notice that payments by the Government are exempt.

Assuming that the moratorium be not extended beyond October 4th, writs will presumably appear like leaves in Vallombrosa after that date. Whether a further extension will be necessary no one can say. Other questions, of interest more to the lawyer than the layman, may arise hereafter. Thus, it may have to be decided what effect the moratorium has upon the Statute of Limitations.

THE DECLINE OF THE SELF-SYNCHRONISING MOTOR.

By ERNEST P. HOLLIS, A.M.I.E.E., A.Am.I.E.E., M.Assn.Mining E.E.

The synchronous motor possesses such valuable power-factor characteristics, that for a number of years endeavours have been made to overcome the disadvantages attendant upon the starting process in order to popularise the motor and to permit it to enter the much larger field which is now very much in the hands of the induction motor. Mainly on account of its simple starting characteristics the induction motor has been able to put up a stiff fight, and in consequence the self-synchronising motor has not made material headway. Its sponsors have mainly sought to push it as a substitute for the large low-speed induction motor, taking advantage of the very poor power factor that such induction motors possess.

With the design of the self-synchronising motor and its auxiliary squirrel-cage winding all electrical engineers are conversant, although, perhaps, the endeavours which have been made to design the self-starting synchronous motor with a high starting torque are not so widely appreciated, for it was recognised that the poor starting torque consequent upon the low starting voltage which had to be applied to the self-synchronising motor weighed heavily against it. For this purpose such expedients as magnetic end-rings to the squirrel-cage winding have been resorted to with a fair degree of success, and in the matter of starting torque the self-synchronising motor in some designs stands on an equality with the induction motor. The disadvantage of the inevitable employment of continuous current for excitation has, of course, never been overcome.

With the advent of the phase-advancer, however, the situation has vastly changed, and it is apparent that this device has entirely eliminated all necessity for the use of the self-synchronising motor, since the induction motor plus phase-advancer can do all that is wanted in regard to the improvement of power factor without in any way sacrificing the simple starting characteristics of the induction motor. At the same time, many of the little troubles which arise from time to time with the self-starting synchronous motor, such as breakdowns due to high pressures induced in the field windings at starting, and so forth, are eliminated.

With the exception of supply undertakings, and in large sub-stations, the orthodox synchronous motor has found very little scope for its services, and it cannot be said, reviewing the situation as a whole, that the self-synchronising motor has greatly improved its prospects. The starting of a self-synchronising motor, to say nothing of an ordinary synchronous motor, cannot in any way compare for simplicity with the starting of an induction motor. The phase-advancer does, of course, introduce a few more complications to the connections of the induction motor, but recent designs of phase-advancer switchgear include such perfect mistake-proof characteristics, that it is quite outside the ability of the operator to do any damage, or to insert any of the switches out of their proper sequence. Numbers of installations of induction motors with phase-advancers are now in operation, the starting of the motor being entrusted to non-technical persons, to whom it would be impossible to leave the starting of either an ordinary synchronous or a self-synchronising motor.

The change in the situation wrought by the more general application of the phase-advancer is worthy of consideration, and it would certainly seem that the promising future of the phase-advancer has set the seal upon the fate of the self-synchronising motor.

REVIEWS.

Practical Iron Founding. By Joseph G. Horner, A.M.I.Mech.E. London: Whittaker and Co. Price 5/- net.

Entirely in keeping with its title is this new and enlarged edition of Mr. Horner's work, a book which should be in the hands of all concerned with foundry practice. As compared with the last edition the present, with its 409 pages and 283 illustrations, has almost doubled in bulk, a fact explained by the very rapid progress in iron founding that has taken place in recent years. Particularly noticeable has been the increasing use of electricity in the foundry, a matter that is suitably dealt with by the author, who rightly holds that "electricity is the agent which, in foundries as in other shops, is the most flexible and the most mobile form of power." It enables the cranes to be worked to the best effect now that these are built with separate motors for each motion and for heavy and light loads, rated suitably for the different speeds and loads. Electricity, too, drives the blowers and other machinery used in the foundry, though we have not yet applied it to the moulding machine, many types of which invaluable modern device are fully described by Mr. Horner in his chapters on "The Elements of Machine Moulding" and "Examples of Moulding Machines." Gear-wheel moulding machines receive a chapter all to themselves, for, as the author rightly says, though these machines are now largely used there are still many shops in which they are unknown. They ought, of course, to be universal.

Unless it be that Mr. Horner has, in his endeavour to be strictly "practical," cut down rather severely his account of the raw material of the iron founder and omitted references that might be useful, we cannot suggest how this very useful handbook might further be amplified, for he describes very clearly, and with adequate photographic and diagrammatic illustrations, the caster's art from alpha to omega.

Researches on Irritability of Plants. By Jagadis Chunder Bose. London: Longmans, Green and Co. Price 7s. 6d. net.

The publication in 1902 of the author's first work, "Response in the Living and Non-living," excited very wide scientific interest, appealing as it did alike to the physicist and the physiologist. He there proved with great experimental skill and ingenuity that electrical excitation in plants, and also in inorganic substances, notably slightly warmed magnetic oxide of iron reduced to powder, and in a less degree, other metallic powders, gave rise to response curves, obtained by taking the galvanometer deflections as ordinates, and the times of exposure, or recovery, as abscissæ, closely resembling those obtained from animal nerves and muscles subjected to mechanical strain. The molecular strain excited in the powders by radiation replaced the mechanical strain in the animal fibres, and further researches in

the author's works on *Plant Response*, and on *Comparative Electro-Physiology*, showed that in the case of both plant and animal tissues, the substitution of electrical methods of exciting strain for mechanical ones provided the physiologist with far more delicate methods of investigation, without changing the character of the phenomena. The similarity extended even to the modification brought about by the administration of stimulants and poisons. Plants and metallic powders, as well as animal tissues, could be excited or depressed, as shown by the variations in electric response, by the administration of drugs, and in each case a limiting critical condition could be produced corresponding to the death of the animal tissue. But the metal could be restored to its state of sensitiveness by purely molecular processes—*e.g.*, by heating to a sufficient temperature and again reducing to powder—but the living protoplasm, once killed, could be restored to sensitiveness only by absorption into living substance, by giving it as food to a living animal or plant.

In the researches described in this, the author's latest work, the methods of excitation are of the same character as employed before. In order to measure the amounts of excitation with the utmost attainable accuracy, the mechanical shocks and changes of temperature, as well as the direct electrical excitation, are all effected and measured by electrical methods, and the ingenuity shown in the design of the recording instruments, and the delicacy and accuracy of their indications, are in themselves such as to make them worth the close attention of every maker of delicate electrical recorders. The observed responses, however, although electrically recorded, are, for the most part, primarily mechanical, for the volume is devoted to the investigation of the movements, in response to excitation, of the leaves and leaflets of various types of what are known as *sensitive plants*—plants possessing very delicate mechanisms, which respond, by mechanical movements, to the various types of excitation.

A large part of the volume is occupied with the mass of experimental evidence tending to establish the conclusions that excitations are transmitted along the fibrovascular system of stalks and petioles (leaf stalks), not, as has hitherto been supposed, as mere hydromechanical impulses, but as true protoplasmic excitations, the fibrovascular system of the plant coresponding to the nerve system of the animal, from which it differs, not in kind, but only in degree. Our limits of space prevent the discussion of this evidence, for the correspondence is shown by similarity in the most minute details of an exceedingly complex system of closely inter-related phenomena. There appears, indeed, to be hardly any phenomenon of irritability observed in the animal which is not also found in the plant, and all the manifestations of irritability in the plant have been shown to be identical with those in the animal. This, as the author points out, should lead to many difficult points in animal physiology finding their solution in the experimental study of the corresponding problems under the simpler conditions of vegetable life. One fact may be mentioned which would in itself make the hydromechanical hypothesis highly improbable—mechanical motions have been shown to be excited in the leaflets of a sensitive plant by a current as low as 0.5 microampere, considerably less than can be detected by the most sensitive human tongue, and less than a tenth of what can be perceived through the tongue of the average person.

A very interesting phenomenon is what the author calls the death-spasm of a plant. If the temperature of a Mimosa leaf be raised gradually, there is a steady increase in the erection of the leaf until the temperature reaches a point in the neighbourhood of 60° C., when a spasmodic fall occurs, and after this no further response can be obtained to excitation. The tissue is dead. G. W. de T.

Electric Car Maintenance. By Walter Jackson. London: Hill Publishing Co., Ltd. Price 12/6 net.

This book is a selection of articles and paragraphs from the columns of the *Electric Railway Journal*, of New York, with some additions of braking and wiring diagrams, designed to serve as a kind of "Enquire Within upon Everything" for the repair and maintenance staffs of electric railway rolling stock. "Railway" must be understood in its American sense of street or interurban tramway, with a small admixture of third-rail lines. The articles have been sorted into thirteen chapters, and instruction prints and tables, mostly wiring diagrams, put into the last and fourteenth chapter.

For the greater part the articles are descriptions of methods, tools, and processes adopted in the repair shops and sheds of various railways in the United States, generously communicated to the Journal by their devisers for the benefit of their fellows in like circumstances. It is difficult to review a book of this character and origin, because, naturally enough, the devices described and recommended are of varying merit, and there is no internal evidence, in most cases, as to the success achieved by their adoption. The task of editing such a collection cannot have been light, and perhaps the success of the editor could only fairly be gauged by inspecting the rejected material.

In quite a number of cases there are several different ways described for doing the same thing—for example, the relining of bearings. A man coming new to the particular job and seeking guidance from the chapter in question would rise from its perusal without much help towards a choice. Curiously enough, a method much in use in this country, and one which has proved alike economical, speedy and efficient under widely varying circumstances, has not found its way into this chapter, viz., to dispense with bearing shells, casting the bearing on a mandril in a chill, solid. The resulting casting needs no machining, and the whole process of melting out and tinning shells is saved.

Whilst the collection of workshop dodges and methods is of somewhat mixed merit, they all bear on their face the suggestion that they are in use, and that they get over some difficulty. In a great many cases the difficulties surmounted are those due to inadequately equipped workshops; special tools and appliances for certain jobs not being forthcoming, ingenuity has utilised the things on hand, sometimes visiting the scrap heap to good purpose. The engineer who has to keep things going in foreign and other out of the way places will sympathise and may pick up many wrinkles from this book. A British criticism on it is that to a very large extent the dodges described are to do certain things to a particular (American) motor, controller, or other piece of apparatus, and are not directly applicable to British-made material. Nevertheless, they are frequently suggestive, and there is no lack of dimensioned figures illustrating the descriptions.

There is a good deal, in one way or another, about slotting commutators, a practice now very general in the States, but not so common here, though not unknown, and piecing together various bits of information, one gets a general notion of the *raison d'être* of the practice. Perhaps a good half of it is expressed in the experience of Mr. F. J. Foote, of the Ohio Electric Railway:—"Very little trouble will be experienced with flat (? flatted) commutators if a brush can be found that is just hard enough to keep the mica even with the copper. . . . This condition, however, will be very difficult to secure and maintain in all cases. . . . In regard to the kind of brushes used, we have never found any brush quite equal to the French brushes, although American brushes nearly as good are now on the market."

The articles on brush and brush-holder setting,

adjustment, and maintenance are among the best in the collection, and are worthy of attention in every car shed, in spite of their special adaptation to American plant.

The collection of wiring diagrams in chapter XIV is very comprehensive, clear, and useful to the persons for whom it is intended and who are handling American equipment. It is the kind of thing every manufacturer of electrical car equipment should prepare and issue to his customers; some do it, some do not. Both will find something suggestive in those now mentioned. Mr. C. W. Squier's "circuit diagrams," showing the circuit through all apparatus for each controller notch, for a considerable number of equipments, can be warmly commended for imitation.

The book is quite a valuable one for men in charge of tramway rolling stock. If they have American equipments they will be able to apply the various dodges directly; if not, their own ingenuity will be much aided by these examples. Electric car maintenance touches so many trades that except in the largest systems it is impracticable to have all the best tools and appliances for every job. Such an equipment would in fact be that of a car and electrical equipment manufacturer. So that, especially in out of the way places, lots of things have to be done without the proper tools. Brains and ingenuity and "what we've got" have to take their place, and the examples from men "who have been there," will often be valuable in suggestion.

The table of contents gives the titles of each separate paragraph in each chapter, making it easy to find a particular note, and there is in addition a subject index. The book is well printed and bound, as one expects from the Hill Company, and the figures in general are self-explanatory and well produced.

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

Half-Watt Lamp Patents.

We shall be very much obliged if you can give us some information regarding the position of patents covering half-watt lamps.

From revelations recently made, not only are the patents of squirted filament lamps owned in Germany, but the greater part of the capital of one of the most important firms manufacturing these lamps is held in Germany, and we are wondering whether this state of affairs exists in connection with half-watt lamps. We should be very much obliged for any information you can give us on the subject.

The Electrical Engineering & Equipment Co., Ltd.

London, W.C., *September 4th*, 1914.

[We believe the principal patents covering the "half-watt" lamp in this country are owned by the British Thomson-Houston Co., Ltd., whose lamp-works are the subject of an article elsewhere in this issue.—EDS. ELEC. REV.]

America and Export Trade.

The letter signed "Innocens" in your current issue appears to me to be a most inappropriate and almost childish outpouring. As your correspondent seems unaware of the fact, let me inform him that at least 95 per cent. of the Americans in business are business men—not sloppy sentimentalists, and although they will not fill the needs of the abandoned German overseas trade this year, they will immediately set about adjusting the 1915 output, and will be up and at it. Moreover, they will easily secure about 85 per cent. of the acceptable business, leaving the long credit jobs in the East, Near East and possibly Russia. To anyone who has travelled a good deal on account of sales and business generally, it will be apparent that delivery of British goods is always unreliable and erratic, while literature and publicity is generally unsuitable, and often conveys nothing to countries like South and Central America. This, to my mind, is indescribably regrettable, as British goods are nearly always superior to foreign or American, with the exception, perhaps, of machine shop tools. The present, however, is not a time to be sentimental, but to face hard facts, one of these being that if British manufacturers are going to capture even 15 per cent. of Germany's late overseas trade, they will have to get busy on the job right now. Don't go and call meetings at home of people who know nothing about the business, but start on the present connection, however small, on the enemy's abandoned pitch abroad, and remember that while one of the two business nations of the world is temporarily out of the field, you are going to be right up against the only remaining one.

If you publish this letter, may I ask that no firm that has the enlarging of its export business seriously in mind should get offended at it? At the same time, however, I would impress it upon your readers that to ask, or even half-suggest, that America should wait until British firms should start even with them in respect to export trade, is a plea of a mental weakling, and although they would hardly take it that way, is an insulting conception of American business ability and intelligence.

Arthur Mallord Turner.

Wimbledon, S.W., *September 7th*, 1914.

Deterioration of Red Cable.

Referring to this subject mentioned in your issue of May 22nd, just to hand, I, for some 16 years, was with the Electric Sign Co., of London, and found out (using both red and black cable in the wiring of the signs) that the red cable was by far the best cable to use, both for cleaning ends and drawing into conduit, but the life was much shorter, as in some of the work taken down after five years the black cable was as good as when put in, but the red was bad, the braiding being loose and the rubber cracked and hard; for this reason I refused to use any red cable in any of the signs for six years before leaving England. I have had some hundred miles of small cable through my hands, and have found the same results out here, whether exposed or enclosed in conduit; it is something that cable manufacturers should look to.

W. Gibbs.

Barcaldine, Queensland, *July 24th*, 1914.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, AUSTRALIA, 1914.—III.

Radiotelegraphic Investigations.

Abstract of Interim Report of the Committee: SIR OLIVER LODGE (*Chairman*), DR. W. H. ECCLES (*Secretary*).

Section A.

THE past year was occupied mainly by the designing, printing, and distribution of books of forms for recording observations, by the enrolment of observers, and by the preliminary work in connection with the observations to be made during the solar eclipse.

For the collection of ordinary daily statistics, the Committee obtained the cordial support of many Government Departments of the British Empire and of other countries.

The following companies are taking a prominent part in the collection of statistics: The Marconi International Marine Communication Co., Ltd., have already twenty-three ships at work; the Marconi Co. of Canada have thirteen stations at work on the East Coast of Canada, in Newfoundland and on the Great Lakes; the American Marconi Co. have put fifteen land stations (between Alaska and the Gulf of Mexico) to work, and several ships; the Federal Wireless Telegraph Co. of America have started observations at their San Francisco station; the Gesellschaft für drahtlose Telegraphie will put a considerable number of stations to work as soon as forms have been translated. At the Slough station the Anglo-French Wireless Co. started observations which will be continued by the Galletti Co.; while the English Marconi Co. are doing the like at Chelmsford. The Société Russe de Telegraphes et Téléphones sans Fil have agreed that the forms, when translated, shall be used at a number of the stations under the control of the company in Russia.

There are also a number of professors in the British Isles and in the Colonies helping, and about sixty-one amateurs.

As a member of the British Section of the International Commission the Secretary was made a delegate to the recent conference in Brussels, and there suggested that it might be to the advantage of both organisations, especially when requesting assistance from Government Departments or companies, or even private experimenters, that a public announcement should be made showing that the aims of the two bodies were different, and that there was room for both. The International Commission therefore passed a resolution to that effect, and at a meeting of the British Association Committee on May 8th, 1914, a resolution was adopted stating that the Radiotelegraphic Investigation Committee of the British Association was in full accord with the definitions, as expressed in the resolution, of the differences between the aims and methods of research promoted by the two organisations.

Gaseous Explosions.

Abstract of Seventh Report of the Committee: Dr. Dugald Clerk (*Chairman*), Professor Dalby (*Secretary*).

Section G.

The report is devoted partly to the special consideration of temperature measurements and subjects arising therefrom, and partly to the illustration of the use which can be made of the data obtained by the committee.

One of the problems requiring solution was the direct measurement of the temperature of the working agent in the gas-engine cylinder while the engine was running under ordinary working conditions. The difficulty of making this measurement rises from the fact that during the explosion of the charge in the engine cylinder the temperature is sometimes higher than that of the melting-point of platinum or of the couples which can be put in the cylinder to make the measurement.

A method devised by Professors Callendar and Dalby for the first time enabled direct observation of the suction temperature to be made while the engine was working not only under normal conditions but under special conditions, during which the richest possible mixture was used and the temperature reached at explosion was considerably higher than that occurring in practice. The thermometer itself consisted of a piece of platinum wire about 0.7 inch long and 1/1,000th of an inch in diameter, arranged with compensating leads. It is placed in a thermometer-valve which is inserted through the spindle of the admission valve.

During the explosion period the valve is closed, and the thermometer screened from the action of the gas. When the platinum thermometer is exposed in the cylinder and connected to the Wheatstone bridge and galvanometer on which the indications are received, the circuit is made by a contact-maker on the crank-shaft when the crank passes through an assigned crank-angle, and is broken by the contact-maker when the crank passes through a second assigned crank-angle a little greater than the first, so that the electrical measuring device is in operation during 5°, 10°, or 15° as the case may be.

The contact-maker (fig. 1) consists of a brass bush B, keyed to a lay shaft of the engine, and carrying two fibre washers

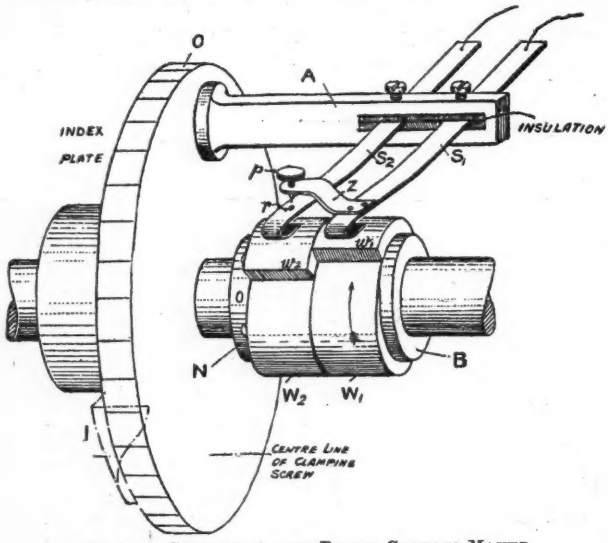


Fig. 1.—Callendar and Dalby Contact-Maker.

or cams W_1 and W_2, which can be clamped in any relative angular position against the flange of the bush by the nut N. A radial step, as w_1, is made in each washer, and the surface gradually rises from the bottom of the step to the normal circular surface of the washer. The reflexed ends of the stiff springs S_1 and S_2 rest on the fibre cams. A projection Z carrying a platinum-pointed screw p is riveted to one of the springs, and the screw p is adjusted so that its point is just clear of the platinum rivet r in the other spring when both springs are riding on the circular surfaces of their respective cams. Contact is made when the rotation of the lay shaft in the direction of the arrow brings the radial step w_1 of the cam W_1 under the spring S_1, thereby allowing it to fall down the step, thus bringing p and r together. Contact is broken when the radial step w_2 of the cam W_2 reaches the spring S_2, thereby allowing the second spring to fall down the step w_2. The epoch and duration of contact are readily adjusted by adjusting the angular positions of the cams relatively to the bush and also with regard to one another. The distances between the springs and the platinum contacts and the steps w are exaggerated in the diagram in order to make the principle of the apparatus clear. The percussion form of contact with platinum points is found to give definite and certain results. The contacts keep clean, and no trouble of any kind is experienced with them. The brushes are carried by an insulated arm A bolted to a divided disc O riding loosely on the lay shaft of the engine, and capable of being clamped in any position by a screw. The index I shows the crank-angle corresponding to the contact.

The temperature is measured, therefore, during a particular crank-angle determined by the setting of the contact-maker. This can be set, while the engine is running, to determine the make and break at any assigned crank-angle in the revolution. It was usually set so that the interval between the make and break was 5° or 10°. In this manner the mean temperature over a small crank-angle can be measured at any point in the cycle, except only during the period of the explosions when the thermometer is withdrawn from the cylinder.

Having found the temperature at one point in the cycle, the temperature at any other point can be calculated by using the charge itself as the thermometric agent. The characteristic equation of the charge is PV/T = a constant. If, therefore, from the indicator diagram taken at the time the temperature was measured, the corresponding pressure and volume are measured, then the temperature at any other point of the cycle can be calculated by the aid of this constant and the pressure and volume scaled from the indicator diagram, allowance being made for chemical contraction of the charge after explosion. It is necessary to have accurate indicator diagrams from which to measure the pressure and volume for this purpose, and this has led to the development of an optical indicator.

The second method of measuring the temperature of the charge in the cylinder is by means of a couple. This method has been developed by Dr. Coker and Mr. Scoble at the Technical College, Finsbury. It was found that alloys of platinum with rhodium and iridium respectively were able to withstand the temperature of explosion near the walls of the cylinder for some hours or even days when made into thermo-couples 5/10,000 to 8/10,000 of an inch thick, provided the engine was not overloaded. The actual temperature measurement is made by observing the change in the electromotive force produced in this couple by a change in temperature. The small changes in the electromotive force produced by a couple of this kind can be measured with great accuracy.

Dalby and Callendar's experiments have shown that when using rich mixtures the maximum temperature in the cylinder is probably about 2000° C., and these results have been confirmed by Coker and Scoble. For the mixtures used in ordinary working conditions the experiments of Dalby, Callendar, Coker, and Scoble show that the temperature is about 1800° C. It is hoped to continue the experiments on temperature measurements when engines of more modern construction have been installed in the new engine laboratory of the City and Guilds (Engineering) College.

The concentration of research on the accurate measurement of temperature is a necessary step towards a more certain knowledge of the specific heat of gases at high temperatures, a subject of vital importance.

Imperial College of Science and Technology.

The Goldsmiths' Company's extension of the City and Guilds (Engineering) College was dealt with in a paper read by Professor W. E. Dalby, F.R.S. After outlining the history of the Imperial College of Science and Technology, the author stated that at the end of 1909 he was instructed to prepare a scheme for the internal arrangements of the proposed engineering extension. Subsequently, he prepared a scheme for a large hydraulic laboratory, and then for a laboratory for structural engineering, motive power engineering and strength of materials, as well as for a laboratory for railway engineering.

These plans were approved by the governing body in 1910. Sir Aston Webb, R.A., was the architect for the whole of the extension, and building was commenced in the spring of 1911. The cost of the complete engineering extension, namely, £87,000, will be defrayed by the sum which the Goldsmiths' Company has generously allocated for the purpose. In addition to this Mr. Hawksley has promised the sum of £4,000 towards the equipment and endowment of the hydraulic laboratory. An additional sum of £30,000 is required in order that the laboratories may be suitably equipped with apparatus and machinery.

The object of the present paper is to describe the general arrangement of the laboratories and the principles on which they have been designed.

The equipment of the motive power laboratory will include a plant of internal-combustion engines arranged specially for experimental purposes, a steam turbine plant, and several independent steam engines, as well as various testing machines. The laboratory has been designed especially with regard to flexibility and to adaptability to the changing conditions of engineering practice. The floor of the laboratory may be regarded as a test bed about 17,628 sq. ft. in area.

The railway laboratory is 106 ft. long and 30 ft. wide, and the total floor area is about 3,200 sq. ft. It is provided with a wind flume, constructed as a closed circuit with a motor-driven turbine fan, so that it is possible to produce a current of air of 60 miles an hour. It is proposed to equip this laboratory with apparatus and models specially suitable for the practical work of the post-graduate course of instruction in railway engineering.

The main object kept carefully in view in the design of the hydraulic laboratory was to give every facility for the study of problems connected with the supply and distribution of water, as well as problems in connection with hydraulic machinery, turbines, and reciprocating pumps. The total length of the laboratory is 166 ft., the width is about 48 ft., and the total area is about 8,000 sq. ft.

About seven years ago the author designed an electrically-driven and controlled turbine and pump plant for laboratory purposes, with the object of bringing together various considerations regarding the transformation of energy and of enabling measurements in connection with the performance of the plant to be obtained with accuracy. The pump and turbine were designed by Escher, Wyss & Co., of Zurich. The electrical equipment was supplied by the Lancashire Dynamo and Motor Co. With this plant it is possible to make all the measurements required to give an accurate knowledge of the performance of the pump and the turbine over the widest possible range of action.

It is not proposed to encourage any considerable increase in the number of undergraduates, but to devote the resources of the college chiefly to the development of courses of instruction of an advanced nature, and to the provision of every facility for research.

The first of such advanced courses at the City and Guilds (Engineering) College is the course in railway engineering which was initiated by the author in 1908. The instruction includes lectures on electric traction and railway electrification. The principal feature of the course is that the lecturers are, in general, engineers of eminence engaged in practice. Students are not admitted unless they have suitable qualifications, such as the Diploma of the City and Guilds (Engineering) College, the degree of B.Sc. in Engineering of the University of London, or a Whitworth Scholarship. Pending the completion of the engineering extension the course is limited to ten students.

Subsequently the author also initiated a post-graduate course in structural engineering to give advanced instruction in constructional work generally. This course is now under the direction of Professor Dixon.

There is also a post-graduate course on electrical machinery and transformers, under the supervision of Professor Mather, F.R.S., which deals with electro-magnetic machinery, rotary converters, the design, manufacture and testing of transformers and the organisation of electrical manufactories. There is also a series of advanced lectures on wireless telegraphy.

There has been no difficulty in obtaining the number of students that, owing to the restricted accommodation, it has hitherto been possible to admit to these courses; and it may be mentioned that, on leaving college, many of the men have obtained important positions for which they have been specially qualified by their post-graduate work.

Great developments are now taking place: the scope of the advanced courses is being largely extended; new departments are being created and additional professors and their staffs appointed; and the Imperial College of Science and Technology will shortly be able to offer every facility for post-graduate study and research to students from all the colleges and universities of Great and Greater Britain.

WAR ITEMS.

What Constitutes a British Firm?—The Chief Constable of Staffordshire intervened last week in the discussion respecting Messrs. Siemens Bros. in the interests of the inhabitants of Stafford. The following is a copy of his letter to the *Morning Post*:—

"Sir,—The letter from Mr. Joynson-Hicks which you published on Wednesday may have a most mischievous effect here and elsewhere. I do not love the Germans a bit better than does Mr. Joynson-Hicks. But, if I had to burn down a German's house, I should at least take the precaution of making sure that it was not full of English women and children.

"At the present time, something between 15 and 20 per cent. of the population of this, the county town of Staffordshire, are directly or indirectly dependent on wages earned at Messrs. Siemens's works here. Out of the total number of their employés there are now less than 20 Germans, of whom most have been for many years in the employment of the firm in this country, while some of them are absolutely essential to the continuance of work in the shops where they are employed. A small number out of those who were employed here are now fighting against this country. I am glad to feel that these will not come back. The works at the present time are entirely under English management, and, therefore, the question of employment of Germans now scarcely enters into the matter at all. I know nothing as to where the profits go to; all I know is that good English money is being paid over by thousands every week for the support of residents here, and if Mr. Joynson-Hicks's suggestion were adopted, and orders refused to Messrs. Siemens on the ground that they are alien enemies, there would come untold misery and distress to a very large number in this town.

"If the President of the Board of Trade likes to accept Mr. Joynson-Hicks's peremptory mandate to take over the management of Messrs. Siemens's works, it will cause no joy here; rather, I am afraid, the contrary, as a Receiver would hardly be able to pay out the very liberal allowance which Messrs. Siemens already some time ago undertook to give to those who went away to the war, and the total amount of which is already equal to the payment of £5,000 per annum. Mr. Joynson-Hicks has been quite misinformed in so far as his statement as to such payments may be taken to apply to the works here.

"By all means, if there is any reasonable and lawful ground for annexing Messrs. Siemens's cash and employing it as a contribution towards the expenses of the war into which we have been so unjustly forced, let us have the money. But that is a matter which comes a long time after the welfare of our own people; while Mr. Joynson-Hicks's perfervid patriotism, unless checked, may bring desolation to this town.—Yours, &c.,

"G. A. Anson,

"Chief Constable of Staffordshire.

"Stafford, *September 4th*."

Mr. F. B. Sinclair, manager of the Electric Street Lighting Apparatus Co., 11, Victoria Street, Westminster, S.W., writes as follows:—"As an individual I hasten to put on record my protest against the disgusting exhibition of outrageous & unbalanced prejudice as is displayed in Mr. Campbell Swinton's letter & equally against yourself in descending to the uttermost depths of the yellow press in consenting to publish it. One can scarce permit oneself to contemplate the frightful atrocities which would attend the triumphal progress of an army toward Berlin if commanded by one so possessed.

"Is it conceivable that he can now meet his fellow-member of the Institute, Sir (*sic*) Alexander Siemens, without deliberately spitting in his face, for that, in effect, is what he is (*sic*) done through the connivance of yourself."

[We are glad that, as Mr. Sinclair points out in his first words, he is an individual; if he were a multitude we should seek safety in flight, for, judging by his ruthless slaughter of the King's English, he seems to be capable of blood-curdling atrocities to which the "disgusting exhibition" of Mr. Campbell Swinton would be but as the muted murmurings of a maiden's prayer.—Eds. Elec. Rev.]

Among other letters received on this subject, is one from Mr. E. J. Williams, resident engineer and manager of the North of Scotland Electric Light and Power Co., Ltd., in which he says: "If it true that 90 per cent. of the capital (in Siemens's) is German, that should be enough for any Britisher. All that Siemens have done during the past 50 years for the electrical trade in this country has been done for dividends—what else? We are all hoping that the hands now employed by such firms will soon be wanted by British concerns."

"Electrical Contractor" writes:—"As it is quite certain that there will be a number of electrical contractors throughout the country who will pledge themselves never to purchase anything of German or Austrian manufacture again, it would be as well in the interests of genuine English firms, if a list of these firms could be prepared. It is, of course, particularly well known that there are numerous firms masquerading under English names, whose capital is supplied from foreign sources, and some of them make a point of carrying on works both large and small for the purpose of masking their chief trade which is that of Continental manufacture. Through long association we have got to think of firms as thoroughly English, but when the matter is looked into closely in a time like this, we find that their capital is supplied from abroad, and the profits are returned to foreigners. Therefore, all such companies as these cannot by any stretch of imagination be called British. One particular case, for example, is that of Messrs. Siemens Bros., but there are numerous others, and it should be, in the interests of the country at large, that no contractors should purchase any articles at all of either German or Austrian make. I, for my part, will certainly pledge myself that so long as I remain in the trade nothing that is manufactured by either of these two countries shall knowingly come into my place.

"Tohill" writes:—"Mr. A. A. Campbell Swinton's letter regarding the Siemens companies in Great Britain is highly instructive, but if he will make a few further inquiries some additional interesting facts might be brought to light.

"In the first place, I believe it is not disputed that whilst the shares of Siemens Bros. Dynamo Works, Ltd., are nominally owned by Siemens Bros. & Co., Ltd., they are really the property of Siemens-Schuckertwerke. In the second place, when Siemens and Halske acquired the business of Siemens Bros. & Co., Ltd., some years ago, probably the effect of this deal on Government departments was considered, as the Woolwich company has always had a good customer in the Government. What more natural, therefore, than to add a British director to the board and to take other steps with the object stated. For instance, I should not be at all surprised if the three directors in England were (as regards a

large part of their share-holdings) merely nominees, and also, if the annual dividend declared since the absorption (4 per cent. regularly) were guaranteed by Siemens & Halske in order to make it appear to the Government that Siemens Bros. & Co., Ltd., were standing, so to speak, on their own legs.

"The financial arrangements of the British and German Siemens companies seem complicated, but I believe it is a fact that virtually, and with the exception of a few small blocks of shares held by English employés, Siemens & Halske are the owners and masters of the whole situation."

We have also received the following letters on this matter :—

In his letter published in your issue of the 4th inst., Mr. A. A. Campbell-Swinton used language none too strong in describing German methods of diplomacy and warfare. No language, indeed, could adequately express our abhorrence of, and indignation at, such immoral and barbarous proceedings.

But I have been a little dubious as to the ultimate result of this boycotting campaign which is being so energetically prosecuted by the Press. This is a stone which may easily rebound in more than one direction. If we are to boycott every firm in which German capital is employed, it seems to me that we may easily do more harm to ourselves than to the Germans. We may, for example, prevent a few of the enemy getting dividends on their capital by throwing a few thousand British workmen out of employment. I should think that means could be devised by which we could make use of any German capital invested in this country without benefiting the German capitalist, as his dividends, if not his capital, might be confiscated by the British Government. If an enemy's ship lying in a British port can be confiscated in war time, why cannot enemy's capital be confiscated in British works, in which case the Government would become part-owner of those works which are now partly under German control ?

Another difficulty which presents itself to me is that a British works may be associated in some way with German interests without this being known to the public.

For instance, it is currently reported, with what amount of truth I do not know, that the A.E.G., of Berlin, are transferring some of their British orders to the B.T.H. Co., who are connected with the G.E. Co., of New York, who in turn are allied with the A.E.G. In giving orders to the B.T.H., or any other company, we may, therefore, be dealing indirectly with the enemy—who knows ?

Where are we to draw the line ?

F. Broadbent.

London, E.C., *September 7th*, 1914.

I have read with much interest the letter from my friend, Mr. A. A. Campbell Swinton, which appears in your current issue, and am much struck with the fact which he has elicited that 60 per cent. of the shares of Messrs. Siemens Bros. & Co., Ltd., are held in Berlin. I note that, being at war with Germany, Mr. Campbell Swinton urges that no patriotic Englishman should give an order to this firm.

I think I may claim that my feelings of horror and loathing at the conduct of the Germans in having provoked this war, and having conducted it in so barbaric a manner, are as strong as those of Mr. Campbell Swinton, but after perusing his letter, I am wondering whether the advice which is given by him is sound.

Capitalists who invest money in a foreign country are, of course, subject to the risk of that capital, or the profits arising therefrom, being confiscated in the case of a war, but what Great Britain has to consider is what should be its policy in view of the future ?

We are not at the present time occupied in winding-up the assets of the British Empire, and we Britishers are all confident that when this ghastly war is completed, the affairs of our Nation will go on as usual. It behoves us then to reflect that the material prosperity of this country has in the past been greatly enhanced by the advantages which it has presented to foreigners for the conduct within our borders of industrial concerns.

In this case, the founders of the firm of Siemens Bros. threw in their lot in England. They did so, doubtless, in the view that their talents and business ability would be best rewarded here, and accordingly this great concern has developed, entirely as it appears from Mr. Campbell Swinton's figures, by the aid of capital drawn from Germany.

In the past we have deemed it a matter of great national congratulation that the conditions of labour in this country and our general legislation should attract foreigners to invest their capital in the establishment of works giving employment to a large number of our countrymen.

Suppose Mr. Campbell Swinton's suggestion is carried out and no further orders are given to Siemens Bros., what will result ? At a time when it is of the highest importance that unemployment should be avoided, the works at Stafford and Woolwich will be closed and a dislocation in the labour market caused. Possibly it may be said that the men thrown out of employment at Stafford and Woolwich will be able to obtain employment in the works of "all British" firms, to whom the orders are diverted ; but such a transference of labour must take time ; especially as it is probable that other electrical factories would not be in a position for a considerable period to make the necessary arrangements to execute the transferred orders.

The homes of the men at the present time are in Stafford and in Woolwich, and the natural clinging to home will cause a very slow removal of the workmen from one centre to the other, and in these times it is certainly desirable that the *status quo* should be preserved as much as possible.

Again, it is highly probable that during the 50 years' operations of the particular firm in question, certain requirements of the Government have been standardised by them, and such standard articles could not be made by other works for many months until they had designed and erected special tools. Such a delay at this juncture would be most undesirable in the national interest.

It would appear, however, that the object to be secured by the drastic action recommended by Mr. Campbell Swinton is to prevent profits going out of the country to aliens. Surely this can be better attained by directing that such profits shall be paid to the Public Trustee, or by the Government commandeering the works, and, possibly, handing back to the shareholders, alien and otherwise, at the end of the war, the £600,000 capital, or such amount of the same that may be intact.

Looking at the matter from the broadest point of view, I would urge that no action should be taken which, in future years, would interfere with the free flow of foreign capital to this country. Hasty action taken under the present terribly trying circumstances would have a very serious effect upon the England of the future.

I see one good result that may arise from the publication by Mr. Campbell Swinton of his striking figures. It may raise the question whether it would not be advisable to promote legislation under which no foreigners should be permitted to hold, indirectly or directly, more than 49 per cent. of capital in any English industrial company carrying on an industry of vital necessity to the State.

Robert Hammond.

London, S.W., *September 7th*, 1914.

The energy with which the Press campaign is being prosecuted to capture German trade must invoke the admiration of the whole of the commercial community, and will, without doubt, have the desired effect of rousing all trades to immediate action. There are, however, certain phases in the proposals of the daily Press which, I venture to suggest, are unsound and not in the best interests of this country.

The commercial community are urged to make war on German trade ; quite proper, and, in the present circumstances, most necessary, but I am afraid that the Press confuse the issue as to what is, and what is not, German trade.

As I understand matters, the objectionable part of German trade is represented by imports. A certain section of the Press include in German trade industries established under the English flag and whose capital is partly or wholly in German hands. It has even been suggested that such firms should not be allowed to continue business during the period of the war, and notices have been sent out by a certain organisation in the electrical trade warning people not to do business with them.

Great Britain has always been a great manufacturing country, and her prosperity is largely due to the fact that she has been opposed to race prejudice and kept her doors open to foreign brains and foreign capital. It must therefore be to the country's advantage to continue this policy, and any tendency towards exclusion would be a retrograde step.

A few years ago, when a large amount of capital left England for foreign countries, there was a great outcry. We now find the Press advocating the driving out of this country of money which has helped to develop England's trade.

For what purpose was the Patents Act of 1907 designed ? Surely to give better protection to British industries, and to attract foreign capital permanently into Great Britain ? That this Act gave a great impetus to British industry cannot be denied.

How often have we heard about competition from Germany, complaints by the thousand against manufactured goods being dumped into England below cost ? Yet, when German capital does find its way over here to be permanently invested in manufacturing industries, thus placing the British manufacturers on a level footing to compete, we find sane men advocating that the British industries with German capital should not only be boycotted, but should not be allowed to continue trading during the period of the war.

There are tens of thousands of workpeople employed in England, in companies in which German capital is invested. If the suggestions of the Press are carried into effect, it must inevitably result in a large amount of unemployment and consequent great suffering.

A glance at the register of British railway companies will reveal large holdings by the Germans. Is any embargo to be placed upon them ? Does the Press intend to urge the Government to stop them from trading ?

I instance the case of my company. It was established by me some 15 years ago as a branch of a German concern. Partly on account of the Patents Act of 1907, and in order to place the business on a sounder footing, an English company was formed in 1909 for the purpose of establishing a works in this country and to further develop the industry. Payment for the German company's assets was made in shares only, so that no money went back to Germany. Freehold land and buildings were secured, and nothing but English and American machinery was installed, and at the time war broke out some 400 English people were employed. We have never at any time employed more than three or four foreigners, all of whom have been in subordinate positions.

I can, with all modesty, claim that my company has been largely instrumental in popularising the telephone industry, and has proved itself a worthy addition to Great Britain's industries, and though it is true that a large number of the shares are held in Germany, this, in itself, should not militate against the welfare of England or interfere with the progress of my company's business.

It is hardly necessary for me to point out that, being an Englishman, as are all those who work under me, my sentiments are entirely British, and I refuse to believe that our Government, which is essentially a business Government, would lend itself to

anything so insane as to interfere with the development of established British Industrials, even though they have been built up with the assistance of German capital. On the other hand, the publicity which has been given to the subject of war on German trade, and the strenuous efforts which are being made to boycott firms similarly constituted to my company, are calculated to do such damage that the Government should make its policy publicly known without delay.

THE STERLING TELEPHONE & ELECTRIC CO., LTD.,
GUY BURNEY, *Managing Director.*

London, W., *September 8th*, 1914.

The letter from Mr. Campbell Swinton in your last issue will be read by his friends with much regret, and I hope that you may be able to find room for at least one protest.

It would appear that it is not your correspondent of August 28th, but Mr. Swinton himself who has no sense of proportion, a deficiency which prompts him to combine great issues with small, to suggest the punishment of the innocent for the crimes of the guilty, and, unhappily, leads him to refer to individuals in a manner which, if not actually cruel is, at least, lacking in the generosity which we should confidently expect him to exercise if he allowed his reason to operate instead of being overborne by his feelings.

This may not be the time, as he says, to discuss the merits of the Siemens family, but it is certainly not the time to hint or suggest without a particle of evidence a lack of loyalty on the part of men whose public work and business dealing during a residence amongst us of almost a lifetime have shown them to be high-minded citizens and honourable men, whose judgment on excesses would be as severe as ours, and whose sorrow must, perforce, be greater.

As suggested by your first correspondent, there is no doubt that the effect of following Mr. Campbell Swinton's patriotic suggestion would involve a considerable sacrifice by some of our compatriots. You cannot interfere with a long-established industrial community without an infinitely greater loss to that community than would be inflicted upon the German shareholders. Of course we can and must make sacrifices in a just cause. The ethics of the matter are perhaps more involved than the economics, and I will not touch upon them now. But the case presented by Mr. Swinton is frankly prejudice. Prejudice is blind, and generally hits a friend with the shaft intended for a foe. Prejudice is also deaf, and so argument becomes useless.

It, however, may be asked, does not the proclamation provide for the retention of the Berliners' dividends, if any? And have not the authorities the necessary powers to prevent any other advantage accruing to the enemy which the continuance of work might give?

If, as your first correspondent rather suggested, this question has been raised as a part of a commercial campaign then, is it too much to hope that the chivalry which actuates our fighting forces shall not be absent from the commercial arena? If, amid all the excitement of a naval engagement, the gallant men of our glorious Navy can think more of rescuing the enemy's wounded than of their own safety, is it unreasonable to expect that we who sit at home at ease should carry out a commercial campaign with some regard to courtesy?

But I return to the personal question. I do not know any of the German shareholders, but I do know the "two Germans who are only English by naturalisation." The one I have met in public work, as Mr. Campbell Swinton has also. If there is any man of whom it might be said that he would prefer not to hurt a fly, it would be Alexander Siemens. The other I have met on business affairs. In my experience no "scrap of paper" was ever necessary to bind the word of G. von Chauvin, and never was there less of a Chauvinist than he.

It is because I know these men, that I resent so strongly Mr. Campbell Swinton mixing up the atrocities of a nation with the names of individuals, and pointing out as a patriotic duty, what, I fear, might turn out to be rank injustice. The proceeding seems to me to be entirely un-English. Hence my protest.

J. E. KINGSBURY.

7, Serjeants' Inn, Temple, E.C.
September 8th, 1914.

In your issue of September 4th, I notice a letter by one "X," attacking Messrs. Siemens.

Though we all, I hope, agree that an arrangement should be made to prevent the dividends resulting from British-placed orders going to an alien enemy, yet, on reading through the "X" letter, one cannot fail to notice a narrow-minded prejudice prevailing, which is to be greatly regretted and which is not in accordance with "fair play."

"X's" opening statement is that 90 per cent. of Siemens's capital is in Germany. In looking through their list of shares, I find that 70,782 shares out of 120,000 are German held, or 59 per cent., not 90 per cent.

The number of German employés has never, I am told on excellent authority, exceeded 10 per cent., and is usually about 2 per cent., and this is more than many so-called British firms can say.

It is disgusting, moreover, to think that any Englishman will stoop to an unfair and despicable interpretation of gifts made by the Siemens family, and that 20 or more years ago.

Again, in "X's" interpretation of this he is wrong. Sir (*sic*) Alexander Siemens did not present King's College Laboratory, it was Sir William; further, if the gift was made in such a spirit one cannot believe that the Governors would accept it if it would be detrimental to English prosperity or people.

Many of your correspondents and evening newspapers are so keen on finding and damaging the Germans in this country (at no risk to themselves), that they would willingly ruin hundreds of Englishmen to do so. 90 to 98 per cent. of Siemens's employés are Englishmen, and many, if not all, of these would be financially ruined if this firm were boycotted for the sake of the German-owned shares.

Certainly confiscate the profits accruing to Germans and apply them either to the country's needs or Siemens's English employés, but never boycott the firm and ruin our own people.

Many people and firms who have given large sums of money to relief funds, &c., and had their names very prominent in the Press, have, at the same time, cut down the salaries of their ill-paid staffs or dismissed them to meet this expenditure; such actions are to be strongly deprecated (and I know of five large manufacturing firms who have done this), and yet they call themselves patriots. Some have made use of this ruse to give competitive prices to obtain orders. These are the people to be boycotted.

I am sure that all true Englishmen can still see fair play, though, like myself, they can sign themselves

A COMPETITOR OF SIEMENS.

September 7th, 1914.

"Common Sense" writes:—"Whilst heartily agreeing with the war on German trade, is it not carrying things rather far to extend this war to German investments in England? As a nation, we have immense sums of money invested abroad, and, therefore, on principle, we cannot quarrel with German investments here, especially when they are employed in manufacturing, and, therefore, have the effect of curtailing the importation of manufactured articles from Germany. The success of an industry (especially a comparatively new industry) depends upon the capital which it is able to attract. The British public have never given any real support to the electrical trade, and, backward as we are, our position would have been a thousand times worse had it not been for the financial support and enterprise of the foreigner.

"Take the large electrical manufacturing concerns in this country, and you would find a very small proportion who have not in some stage of their history had to largely depend upon foreign support, either in the shape of capital or credit.

"Doubtless there are many manufacturing concerns in England to-day who are supported partly by German capital, which they would only be too pleased to replace with British money if the British capitalist would come forward and divert into his own pockets this pipe-line of gold in the form of dividends which, according to the daily Press, has been flowing to Germany.

"The Patents Act of 1907 was a direct discouragement to the importation of patented articles manufactured in Germany, and a direct encouragement to the employment of German capital in Great Britain, with the result that many articles which were previously imported are now being manufactured in British factories by British labour. Putting all party feeling on one side, the effect of this has been distinctly good, and if we are now going to turn round and drive foreign capital out, we are simply cutting off our nose to spite our face."

"Britisher" writes:—"I am in substantial agreement with the views put forward in Mr. Sydney S. Galsworthy's letter printed in your issue of September 4th. I note that you suggest that the B.E.A.M.A. should take up the task of classification. The B.E.A.M.A. certainly should be able to get first-hand information, but I should say it is very doubtful that they would do anything, as any publication such as Mr. Galsworthy suggests would bring out into the limelight facts which some of the most prominent members of the B.E.A.M.A. would rather the public did not know.

"The average man in the street would be astounded to learn how much German capital and control—either by alien or naturalised Germans—there is in our principal electrical manufacturing companies. Where German is not the predominant influence, one can say it is only substituted by American influence and capital.

"And this brings me to Mr. Campbell Swinton's remarks. While we agree with many of Mr. Swinton's remarks, and the spirit which prompts them, many of us who know Siemens and their staff can hardly go so far as he does. One cannot forget the many excellent Englishmen on their staff, and the very excellent example they set to the large electrical firms—some of whom are benefiting by the attack on Siemens—by the generous way they have treated their staff and workpeople who have gone to the front, or been called up in Territorial forces.

"In my early days of electrical engineering, Siemens were looked upon as one of the aristocrats of the industry, and certainly English influence, if not money, was predominant. There is little doubt, however, that in late years a strong German influence has been manifest, and large portions of the orders they have obtained have been manufactured in Berlin.

"But if Mr. Campbell Swinton is consistent, why should Siemens be his one special victim? Why does he not examine the list of shareholders of the British Thomson-Houston Co., Ltd., and the General Electric Co., Ltd. Anyone in the electrical manufacturing circles in this country can tell him there are very large German interests in these companies, and the major part of their control is in the hands of Germans—in the B.T H. case American interests are also largely involved—though a great number of these are naturalised. Still they have German interests.

"In addition to the firms so far mentioned, there is, of course, a very large company which was originally entirely financed by American capital, and must be still influenced to some extent by American capital and brains—I refer, of course, to the British Westinghouse Co. Still, America is our friend and not a hostile nation, and that counts for a lot.

"My plea is that every encouragement should be given to the medium-sized all-British electrical manufacturing firms who have bravely kept their end up against the fierce competition initiated by the large manufacturing firms mentioned, bolstered up by the immense amount of German and American capital introduced into these large firms.

"Now is time of reward for such firms as Dick, Kerr & Co., the Lancashire Dynamo and Motor Co., Mather & Platt, E.C.C., Bruce Peebles & Co., J. H. Holmes, Brush Co., Ferranti, and other smaller firms whom one cannot detail off-hand. These are the firms to encourage. They are British, and it must be also obvious to the clear-sighted buyer that it is greatly to his advantage that such firms should be encouraged and not crushed out by the very large concerns."

"A Compleat Englishman."—"Englishman" writes:—"Adverting to the letter from Justus Eck, Esq., in your 'Correspondence' column of last week's Review, it seems to me that his main object is to dissociate himself from most things German and to prove he is a true-born Englishman. On the face of it he has creditably succeeded, but I think he has overlooked the fact, or, perhaps, not had time to state that he is, or was until the present war broke out, also managing director of the English branch of Messrs. Voigt & Haeffner, Frankfort (now known as the Switchgear Construction, Ltd.). As he has gratuitously given us full details of the Union Electric Co., perhaps it is not too much to hope he will also furnish us with similar details of his connection with this 'Birmingham' firm. It is only at times like the present that we really know how many patriotic Englishmen we have amongst us, when all with financial interests at stake are ready and willing to publish a guaranteed correct list of their antecedents from the year 1."

In your issue of September 4th, Mr. Justus Eck makes a pathetic appeal to us on behalf of the Union Electric Co., Ltd. After making some interesting autobiographical statements, he tells us that "every employé of the Union Electric Co., Ltd., during the 14 years of its existence, has been, and is, a British-born subject, and the same applies to the majority of the board of directors." So the majority of directors of the company have been, during the past 14 years, British-born subjects; and are so now. Reference to the return filed at Somerset House shows the following changes in the board:—

Directors up to 1912:—Henri Garbe, of Aachen, Germany; Max Koerting, of Leipzig, Germany; Max Muller, of Aachen, Germany.

In 1912, upon the death of Mr. Max Muller, Mr. G. A. Knapton, of Clapham, joined the board, and in July, 1914, Mr. E. Marshall, of Chiswick, and Mr. H. E. Moul, of Herne Hill, were added to the board; presumably to strengthen it in view of the impending crisis, but it should be noted that they hold no shares in the company.

Now let us see in whose interest this British company is carried on. Here is the latest return of shareholders:—

Shareholders at July, 1914.

O. Baerwinkel, of Munich	1	share
H. Garbe, of Aachen...	1	,,
Max Koerting, of Leipzig	1	,,
Exors. of Max Muller, of Aachen	1	,,
Victoria Garbe, of Aachen	1	,,
Frances Eck, of Chiswick	1	,,
L. Reincke, of London	166	,,
Sarah Bolling, of Copenhagen	167	,,
Justus Eck, of Chiswick	502	,,
Koerting & Mathieson, of Leipzig	7,804	,,
Deutsche Electrische Werke, of Aachen ...	15,605	,,
	24,250	shares

With these figures before us are we to believe that the company is run in the interest of the British shareholders, who hold 669 shares against 23,414 held in Germany? And those three apparently British-born directors who don't hold any shares: What has Mr. Eck to tell us about them?

There is more than one way of explaining how essentially British we are. Mr. Eck has chosen one; a German baker in Islington chose another when, a few days after the declaration of war, he wrote across the front of his premises—

"This is an Engelische Shopp."

Doubtless your readers will prefer the method of the Islington baker. It has the merit of simplicity, and hides nothing.

Chiswick, *September 8th*, 1914. Sydney Evershed.

Mr. Evershed, in one of your contemporaries to-day,* accuses me of telling a lie by concealing facts in a letter similar to one from me, which was published in your last week's issue.

Mr. Evershed admits that the majority of the existing board are British. I never stated that they had always been so, the standard directories, manuals, and Board of Trade Register having given the particulars yearly.

Mr. Evershed gives false dates and then assumes that certain acts were done "in view of the impending crisis."

He gives the number of shares held correctly, but does not state that all the British-held ones are fully paid and the German-held are not; this makes a difference of £10,000.

The British directors were elected by the British shareholders to protect their interests, and are gentlemen well-known and respected in the electrical industry. Justus Eck.

London, S.E., *September 9th*, 1914.

* Mr. Evershed's letter referred to was also received by us, and appears above.

British Coil-Winding Business.—We have received the following letter:—"It has come to our knowledge that a certain competitor of ours in the winding business—a German—being now unable himself to make deliveries of German-made coils to his customers, has been spreading a report here, that as the Varley Magnet Co., Ltd., is dependent upon Germany for the supply of raw material, this company is also unable to deliver its manufactured goods.

"This statement is absolutely false, for we use British raw materials in our manufactures, and as we believe the report to be widely spread, we trust you may be able to publish this refutation.

"It is unfortunate for our German rival that whilst his business should be stopped, our own is now being carried on uninterruptedly, and is largely enhanced by a bulk of work which before the war came direct to this country from Germany. The Varley Magnet Co., Ltd., in their new factory equipped with the most modern winding plant, are in a position to carry out any orders entrusted to them, and particularly will they energetically handle work which has previously been manufactured outside this country. We are determined that this extra business which we are now experiencing, and which we hope to further experience, shall lead to a permanent increase in the employment of British labour, capital and materials, and we hope that manufacturers of other electrical specialities may be able to report similarly.

"As the coil-winding business in the past has largely been associated with German connections, may we, in conclusion, say that this company, without exception, is English—in capital, directors, managers, clerks and workpeople.

"The Varley Magnet Co., Ltd.,
"Charles Oliver, *Director*."

British Bulbs for Electric Lamps.—It is often stated, quite erroneously, that all glass lamp bulbs are imported from the Continent. There is no fear, however, of any stoppage in the lamp-making trade for want of bulbs. The Lemington Glass Works, Newcastle-on-Tyne, which were acquired by the General Electric Co., Ltd., 10 years ago, in order to make certain of an independent British supply of bulbs, have been gradually extended from two to six glass houses, employing 250 workpeople, and the G.E. Co. is willing to meet the needs of all lamp-makers who find difficulty in obtaining bulbs.

London Transport Companies.—Of the 30,000 men employed by the London Electric Railways and the omnibus and tramway companies associated with them, 4,000 have gone to serve their country, and others are still going. The companies have agreed to keep their places open, and have made an arrangement with the remaining employés to look after the families of the absentees. All the employés are contributing to a fund every week, and the companies are adding to it the same amount as the men.

Tramwaymen Enlisting.—About 80 employés of the Birmingham Tramway Department enlisted in the 88th Battalion Royal Warwickshire Regiment last week, bringing the battalion up to full war strength. About 200 tramwaymen also offered themselves, but could not be enrolled.

Board of Trade and Inquiries.—The Board points out to British manufacturers and merchants, who wish to obtain information in regard to trade matters in the Colonies or foreign countries, that it is desirable that applications should first be made to the Commercial Intelligence Branch, 73, Basinghall Street, London, E.C., before communications are addressed to the Board of Trade Correspondents or to H.M. Consular Officers abroad. By the adoption of this course, much delay will be avoided by the inquirer in cases in which the Commercial Intelligence Branch is already in possession of the required information. Communications addressed to the Board of Trade Correspondents or to H.M. Consular Officers should be sent direct and not through the Commercial Intelligence Branch. Catalogues, price lists, &c., should also be forwarded direct.

Institute of Commerce.—In order to deal effectively with German and Austrian trade and other matters affecting British trade, an Institute of Commerce is being formed, with temporary offices at Exhibition Building, Aldwych Site, Strand, W.C. The objects of the Institute are to place authoritative trade opinion in closer contact with the Government, and to enable all trade sections to assist one another in obtaining valuable foreign contracts and to take such combined action (financially or otherwise) as may be considered necessary for the purpose.

One of the departments will deal with the electrical industry, while another will consist of a representative committee of bankers to handle the question of commercial credits in conjunction with the Council of the Institute. Manufacturing firms interested in the proposal should communicate with Mr. J. Taylor Peddie, at the above address.

Relief Funds.—At a meeting of the employés of Messrs. Alfred Graham & Co., St. Andrew's Works, Crofton Park, S.E., it was decided to institute a local war fund, and periodically to contribute therefrom to the National Relief and other funds. The staff and employés have unanimously agreed to contribute 2½ per cent. of all salaries and wages paid, and the firm are including a substantial subscription. A number of employés have joined the colours, the firm granting allowances to dependants.

A Splendid Record.—No fewer than 900 members of the staff and various works of the British Thomson-Houston Co., Ltd., have joined the Colours, or more than 50 per cent. of the eligible male adult employés. It is the company's intention to pay half wages to those of its employés who have enlisted, and to reinstate them in their former positions on the cessation of hostilities. In those positions where fresh help has to be employed to keep the works

going, no male candidates will be considered who are not over 35 years of age, or who cannot give proof that they are medically unfit to enlist. Reserve and Territorial Officers on the staff of the company have rejoined their respective units in the Navy, Lancashire Fusiliers, and the King's Horse, and it is noteworthy that one of the officers, not being able to obtain his former commission, has volunteered as a gunner in a Howitzer Battery.

Lord Kitchener has sent a letter, through Major-General Rawlinson, to the managing director, expressing his appreciation of the company's attitude.

Not Paying at Present.—We have received the following letter:—

We received this morning a statement from Messrs. H. Traun and Sons, London Agency, asking for payment. We enclose you copy of our reply to them in case you should consider it of interest to your readers.

Faithfully yours,
Nalder Bros. & Thompson, Ltd.,
Fras. H. Nalder, *Managing Director.*

[copy.]

Messrs. H. Traun & Sons, London Agency,
25, Goswell Road, London, E.C.
September 8th, 1914.

Dear Sirs,—We beg to acknowledge receipt of your statement for goods supplied asking for payment. As you are alien enemies, we have no intention of paying you until after the war, excepting that you can satisfy our Courts that you should be paid now.

Faithfully yours,
Nalder Bros. & Thompson, Ltd.

British Drills.—The Light Electric Motor Co., Ltd., of Seven Kings, Essex, ask us to state that the portable electric drilling machines supplied by them are of British manufacture throughout, being made at their works at Seven Kings.

Payment for Public Contracts.—The *Times* states that representations have been made to the Government Committee on the prevention and relief of distress that business would be facilitated if payments in respect of works under contract could be made at shorter intervals than has been customary. The Committee state that the War Office are willing to make interim payments fortnightly instead of monthly; the Admiralty have arranged for weekly payments; and the Office of Works for fortnightly or weekly payments when desired. The Post Office and the Office of Works have decided to expedite the payment of all accounts.

Shift Workmen!—Of the many extraordinary ideas which this war has conjured up in the brains of, at other times, presumably sensible people, the following extract from a letter addressed by Mr. J. M. Henderson, M.P., to the *Times* of September 2nd, is hard to beat. In speaking of German firms and companies conducting business in this country, he remarks:—"It is said that to put a stop to their trading would cause unemployment in this country. That, however, is not so. The goods they make can be, and are, made by other firms, and the workmen would merely shift to those who got the order for the goods."

Does Mr. Henderson express this pious opinion as an M.P., as a member of the B.E.A.M.A. Council, or as a director of an electrical engineering company, and, in any case, does he really believe it? Is it not a fact that some of the firms have reduced salaries and wages to their existing employés, and are quite unable to offer vacancies for either new staff or new workpeople? We commend the letter of the Chief Constable of Stafford to Mr. Henderson's serious consideration.

Edinburgh.—The first of the public departments to contribute to the War Fund was the Corporation electricity department, who voluntarily agreed to contribute weekly till the close of the war amounts varying from 1 to 2 per cent. of their wages.

Blackpool.—Some 70 of the season staff have sent a petition to Blackpool tramways manager (Mr. C. Furness) asking to be allowed to pay to the War Fund the same sum weekly as those whose living is assured. The season men are to be employed as long as ever it is possible.

All-British Exhibition.—What will happen by March, 1916? We may rest assured that the Germans will not then be in London, for the International Trade Exhibitions, Ltd., of Broad Street House, New Broad Street, E.C., announce that in connection with the war on German and Austrian trade they are organising for March-April of that year a "London Fair and Market," to be held at the Royal Agricultural Hall, London. The exhibition will be exclusively for manufacturers and wholesale houses, and every entering exhibitor will be required to sign a declaration, under a penalty, that no goods exhibited are of German or Austrian manufacture. The whole of the proceeds of the gate, and from the sale of tickets to trade houses, will be given to one of the existing Public Funds for the benefit of the dependants of the soldiers and sailors who fall in the war.

Competition with German and Austrian Trade.—The Commercial Intelligence Branch of the Board of Trade, at 73, Basinghall Street, E.C., are desirous of hearing from firms who are prepared to send to them samples or catalogues of German and Austrian or Hungarian goods which have competed with British products at home or abroad. The Board of Trade propose to hold an exhibition of samples of this nature, and would welcome the co-operation of British manufacturers and traders.

Another of the Board of Trade's series of publications gives very full information respecting our enemies' exports of machine tools and some notes on the position in the different markets of the world for the use of firms interested in this branch of engineering industry. Yet another deals similarly with printing and lithographic machines. Pumps and pumping machinery are covered in a third pamphlet; and others received just as we go to press deal with tubes, pipes and fittings of iron and steel, and anchors, grapnels and chains.

In the machine tool pamphlet the following comparative figures of British and German exports of such manufactures are given:—

Country to which exported.	Exported from Germany, 1912.	Exported from United Kingdom, 1913.
United Kingdom	£236,850	—
Canada	52,650	£24,800
Australia	21,700	115,800
Norway...	57,600	6,600
Sweden...	83,950	10,400
Denmark	49,200	3,800
Netherlands	154,150	17,900
France	554,050	142,100
Switzerland	207,800	3,200
Spain	74,850	20,600
Portugal	15,950	6,500
Italy	408,350	68,500
Bulgaria	18,850	—
Greece	4,450	1,200
Roumania	63,800	800
Russia	595,550	85,000
Turkey	27,600	3,300
Dutch East Indies	23,100	3,400
Japan	51,950	118,100
Brazil	153,850	57,700
Uruguay	19,050	2,700
Argentina	114,300	30,600
Chile	23,250	17,100
United States	59,250	4,400
	£3,072,100	£744,500

"As Usual."—Mr. Harry Moss, of Bradford, reports that in spite of the war he is doing good business. During the last few days he has received orders for a turbo-alternator for mill lighting; several orders for considerable extensions to various installations at mills, hotels, factories, &c., and above the average in supplies. His hands are working full time, and are contributing to the Lord Mayor's Local War Fund.

Manchester Tramwaymen.—Mr. McElroy, general manager, reported, at a recent meeting of the Manchester Tramway Committee, that 369 employés in that department who were Reservists or Territorials had been called up for service.

Never by Choice.—Mr. E. Stanley Fardon, electrical engineer, 67, Mosley Street, Manchester, has issued a notice to the effect that the tenth anniversary of the establishment of his business occurs next month, and that he is prepared to make rewards of £500 to anyone who can prove that he has ever used cables or wires other than British made in installation work, or sold lamps other than British made, unless specially requested to do so.

The Minerva Battalion.—No fewer than 40 of Messrs. Pinchin Johnson's employés have left their work to serve the country. Some are Reservists who have rejoined the colours, some have volunteered for foreign service with the Regular Army, whilst others have entered the Territorial ranks for home defence. The firm are keeping every position open for the men when they return, and whilst away all those who are married receive half-pay.

E.P.S. and the War.—The Electrical Power Storage Co., Ltd., has posted up the following enlistment notice:—"The company has decided to pay the following allowances to the dependants of men who have left its service to enlist for the present war, or who have been called up as Reservists:—(1) To wives with children under 14 years of age—half pay. (2) To wives without children—10s. per week. (3) To the dependants of unmarried men—an allowance to be settled according to the circumstances of each case. The above allowances will be paid whilst the men are on active service, and all particulars of such dependants are to be given to the works superintendent.—Manager."

Lancashire Dynamo Works.—A large number of men employed by the Lancashire Dynamo and Motor Co., Ltd., of Trafford Park, have joined the colours, and the firm has decided to pay 5s. per week to the wives of the married men, and 1s. 3d. per week for each child, with a maximum of 10s. per week per family. Dependants of unmarried employés will also receive a weekly grant. The situations of all men who volunteer for service will be kept open for them. The staff and workpeople have agreed to a deduction of 2½ per cent. from their salaries or wages for the National Relief Fund.

No "Place in the Sun" Company for German Goods.—The Sun Electrical Co., Ltd., writes as follows:—"In view of the fact that a large numbers of the firms engaged in our particular business are either German, or dealing almost exclusively in German goods, we would like to draw your attention to the fact that this company has, since its formation, been entirely run by English capital, with an English board of directors, under English management, and with a British staff. Right from the commencement, no foreigner has ever held any position whatsoever in the company. Furthermore, the whole of our specialties, without exception, have been exclusively British throughout, and so have the greater proportion of our factored goods." The writers enclose with their letter a list of all articles included in their various sectional catalogues, showing that the proportion of foreign goods has always been small, as it has also been the policy of the company to deal with British firms wherever possible. The firm add: "We would like to add that, in the future, this policy will be materially extended to exclude everything of German manufacture."

Messrs. Booth Bros., Ltd., electrical engineers, of Rodley, Leeds, have decided to make a weekly allowance of 5s. for the wives and 2s. for each child dependent upon men in the firm's employ who have enlisted.

The employés at the Dewsbury Corporation electricity works have been assured that if any of them volunteer for service in the Army, they will have their places kept open, and provision will be made for their dependants.

Ten per cent. of the employés of the Yorkshire Electric Power Co. have offered their services to the country. As a result of this patriotic response by the men, the company is short-handed for the time being. A special staff war fund has been opened to which each remaining member of the staff is making a weekly contribution, the proceeds being devoted to assisting the dependants of the employés who are on active service. If there is any surplus it will be devoted to other funds.

Contributions to the Manchester fund announced on Saturday included the following from the electrical trades:—Messrs. Chas. Macintosh & Co., Ltd., £49 13s. 9d.; ditto (employés), £49 13s. 9d.; employés of Electromotors, Ltd. (first weekly contribution), £4 14s. 6d.; employés of Mr. Bertram Thomas, £3 13s. 1d.; employés of Messrs. Drake & Gorham, £3 11s. 11d.

The employés of the Tudor Accumulator Co., Ltd., Dukinfield Hall, are contributing 2½ per cent. of their gross earnings to the distress fund

The employés of the Doncaster Corporation Electricity Works, including the staff of the tramways departments, have held a meeting and resolved to give 4d. in the £ of their salaries and wages to the Mayor of Doncaster's War Relief Fund.

Laurence, Scott at the Front.—About 100 of the employés of Messrs. Laurence, Scott & Co., Ltd., manufacturing electrical engineers, of Norwich, have joined the Army, and the firm have agreed to reinstate them at the end of the war. Allowances will be made to all dependants, and in the case of married men from 6s. 6d. to 11s. 6d. per week will be paid, according to the number of children.

Sixty-four of the employés of the Hackney Borough Council volunteered to give up four hours each day for the special duty of guarding the Council's electricity station. They have been enrolled as special constables and are now engaged in guarding the Council's property.

It is stated that the full staff of the electricity department of the Marylebone Borough Council, numbering 200, have been sworn in as special constables.

Carels Freres.—The *Financial Times* has investigated a rumour that has lately been current, to the effect that the engineering works in Belgium of Carels Frères were either wholly or partially destroyed during the recent fighting. It finds, however, that, according to advices mailed from Ghent on 31st ult. all was well. The works had been closed down to manufacturing operations, and the upper portion was being used as a Red Cross establishment. Ghent, where the Carels establishment is situated, is a good way removed from the fighting area, and, moreover, the Germans have undertaken not to molest the town.

British Westinghouse Staff War Relief Fund.—The amount subscribed by the staff to the above fund has amounted up to date to £937, and it is anticipated that further amounts to be received will raise the total to over £1,000. Out of the amount already subscribed the Committee have decided to make the following donations:—National Relief Fund, £350; Stretford Civic Guild of Help, £100; British Red Cross Society, £200; Belgian Relief Fund, £200; total, £850; the distribution of the balance to be considered at a later date. The contribution made by the staff is entirely separate and distinct from the amounts which the company have already given or which they are contributing week by week to the Relief Committee. The total number of staff concerned is about 1,200. In addition to these contributions, it is the desire of the employés of the company generally to form a further fund by weekly contributions on a graduated scale, and a meeting is to be held on Monday next to consider a suitable basis. The total number of men who have gone to to the front from the company's works and offices up to date is 700.

Engineers' Club Battalion.—We learn from Mr. Hill, the hon. secretary of the Engineers' Club at Manchester, that at an extraordinary general meeting of the club members held on Tuesday, it was decided to form a "Pals" battalion for Kitchener's Army, such battalion to be recruited from those engaged in the works and offices of engineering concerns. A Special Committee was appointed, consisting of Messrs. Daniel Adamson, H. T. Wilkinson, J. H. Stubbs, E. Simon, S. L. Pearce, G. Hughes, W. T. Anderson, E. T. Morland Johnson, E. L. Hill, and Colonel Hollingworth. Every member of the club is asked to induce his friends, staff, and employés to join, and to send their names as quickly as possible to me at the club. The particulars that should be given are:—Name in full, age, address, married or single, if married, number of children under 16 years of age, occupation, name of employer, previous training, if any, in the Forces of the Crown.

Hans Renold, Ltd.—Mr. Hans Renold, who was detained at his birthplace in Switzerland in the early days of the war, recently addressed meetings of his workpeople and urged the younger men to volunteer, but pointed out that others could also serve their country by keeping business going and contributing to the support of the dependants of those who were fighting. The firm has adopted a scheme under which married men receiving 50s. a week or less will be paid full wages for a month, and half-pay till the end of the war; if a man is killed the same allowance will be continued to his dependants until the end of the war or until they obtain a pension. Places will be kept open for the men. Those in receipt of more than 50s. a week will receive individual consideration. A very large proportion of the employés have joined the colours; and the firm is working full time.

Lessening Unemployment.—We notice your remarks in last week's Electrical Review, and wish to state that we are quite in sympathy with your remarks *re* the dismissal of men and the reduction of wages by firms who have largely contributed to the "Prince of Wales's" Fund.

Our firm, under the management of M. K. Cooper, A.M.I.E.E., instead of dismissing, have, since the war was declared, employed 20 extra men, and are still open to engage good wiremen. No wages have been reduced, and our people are contributing weekly to the "Prince of Wales's" Fund; last week our contribution amounted to £4 4s.

It might also be worth mentioning that on the day war was proclaimed we cancelled orders to the extent of £3,000 with German firms, and these orders have now all been placed with British firms. We are, therefore, in the happy position of feeling that, by employing as many men as we can, we are doing something to lessen unemployment amongst our own people.

T. C. Smith & Co.

M. K. Cooper,

Manager for Electrical Department.

Aberdeen, *September 7th*, 1914.

LEGAL.

Factory Act Prosecution.

At the Sunderland Borough Police Court on Friday, the North-Eastern Marine Engineering Co., Ltd., South Dock, Sunderland, were charged with an infringement of the Factory and Workshops Act, by having on their premises a switch not so constructed as to prevent danger.

Mr. W. B. Lauder, H.M. Inspector of Factories, in preferring the charge, said the defendant company had neglected to observe Regulation 3A of the Electrical Regulations instituted by the Home Secretary under Sec. 79 of the Factory and Workshops Act, 1901—a regulation which provided that every switch should be so protected as to prevent danger. In this case the switch concerned was quite open and without a covering of any description. On July 21st a young man named Peter Cornforth was killed in consequence. According to the evidence given at the inquest, Cornforth went to switch on the current in order to work a pneumatic hammer. His hand slipped and came in contact with the live terminals, and he received a fatal shock of 240 volts. Three other people had received shocks from the same switch. The maximum penalty for the offence with which the company were charged was a fine of £100.

Mr. D. B. Jackson, from the office of Messrs. Cooper & Goodger, Newcastle, solicitors, pleaded guilty on behalf of the defendants, but submitted at the same time that it was not a very serious case, although, unfortunately, there had been a serious termination. The switch had been in use nine or ten years, and no one had been injured prior to the fatality. If shocks had been sustained by other people the occurrences had not been reported. It never occurred to the firm that there was any danger, and the Factory Inspectors had never drawn attention to the danger. After the accident a new switch with proper covering was immediately installed.

The magistrates imposed a fine of £50 and costs.

OUR LEGAL QUERY COLUMN.

"Inquirer" writes:—"As you are aware, we are subscribers to your paper, and thought, therefore, you might be able to enlighten us upon the two following points:—

"(1) *Tenancy Agreement.*—Is a tenancy agreement between an English landlord and an alien tenant of a nation with whom England is now at war void, or can the landlord enforce the conditions and payment for the full term just the same as if there were no war?

"(2) *Employment Agreement.*—Is an agreement between a naturalised British employer resident in an enemy's country and a British employé resident in England valid, or is it cancelled by the war? If so, must notice of cancellation be given to the employé?"

*** As to (1), it is clear that the agreement still holds good. The rule that an Englishman may not contract with an alien enemy only holds good with reference to a contract with a person resident in the hostile belligerent country. As to (2), the fact that the employer is admittedly a British subject appears to make the agreement perfectly valid. A difficulty would appear to arise when an attempt is made to enforce the agreement.

BUSINESS NOTES.

Consular Notes.—CHILE.—The American Consul at Valparaiso reports that during last year work progressed on the extension to the hydro-electric plant in connection with the Broden Copper Co., near Rancangua, and plans have been under consideration to develop the water power of the Aconcagua River, above Valparaiso, for the use of the cities in the valley as well as for Valparaiso, where the current is now generated by steam, with coal selling at 25s. to 33s. per ton. The current is sold in Valparaiso for lighting purposes at 7d. per KW.-hour. The country is full of fine water-power sites that await capital to turn the waste power into electric current for distribution to the cities and towns, where are located small plants now run by steam power with coal costing 37s. 6d. to 50s. per ton. It is generally understood that this would be a paying investment from the start, and would be much more profitable when the demands for electric power became greater.

During 1913 the chain of seven wireless stations along the coast of Chile, viz., Arica, Autofogasta, Coquimbo, Valparaiso, Talcahuano, Puerto Montt and Punta Arenas, were completed, save the station at Puerto Montt, which is under way, and good progress was made on the station on Juan Fernandez Islands, to the west of Valparaiso. The Chilian Government has taken steps to put this service at the disposition of the commercial world, and the Director-General of Telegraphs of the country has been authorised to prepare a tariff list, and such other regulations as seem best, to connect up for commercial purposes with the other stations of the world.

MONTENEGRO.—The Austrian Consul, in a recent report, states that since 1910 the electrical works at Cetinje have been operated by a Trieste firm with a capital of 400,000 kronen (krone = 10d). The plant works with two Diesel motors, and the installation of a third was projected at the time of writing. Only night work is carried on, and the power produced (2,000 volts) is used exclusively for lighting. The works projected in Montenegro for subsequent execution include electric light plants for the towns of Podgorica and Niksic, and refrigerating plant for Antivari, where a small electric plant for lighting the docks is already operated by the Compagnia di Antivari.

COREA.—In a recent report dealing with the graphite deposits of Corea, the German Consul at Seoul observes that the number of concessions has decreased from 135 on January 1st, 1912, to 117 on January 1st, 1914, the area having decreased from 28,554,717 tsubo (tsubo = 3·3 sq. m.) to 22,545,886 tsubo. In 1913 241,973 piculs of graphite were exported, nearly the whole going to Japan. One of the chief exporters is a Japanese firm in Fusan, who has concessions in Toksuri, where he has recently built a narrow gauge railway about 12¼ miles long to the Hoangkan station on the Seoul-Fusan line, which enables him to ship the graphite cheaply. At the beginning of 1913 the first direct shipment to Europe (500 tons) was made in a French steamer from Fusan, and now when the above-mentioned railway is fully working, regular shipments are proposed.

Catalogues and Lists.—STERLING TELEPHONE AND ELECTRIC CO., LTD., 210-212, Tottenham Court Road, London, W.—Publication No. 236 (8 pages), containing illustrated descriptions and prices of various loud electric bells and sirens.

MESSRS. SIEMENS BROS. & CO., LTD., Woolwich, S.E.—New edition of pamphlet C513, describing their mine signal indicator for use with electric or mechanically-operated bells or rappers.

MESSRS. KRUPKA & JACOBY, LTD., 39, Victoria Street, London, S.W.—Three illustrated price leaflets relating to indirect fittings, electric candlesticks, and vase standards.

MESSRS. E. BROOK, LTD., Colne Road, Huddersfield.—September stock list of single, two and three-phase electric motors.

THE BRITISH THOMSON-HOUSTON CO., LTD., Rugby.—Price list No. 5,511, describes, and gives prices of, their float switches for A.C. or C.C. circuits.

THE EDISON & SWAN UNITED ELECTRIC LIGHT CO., LTD., of Ponder's End, have issued some coloured advertising postcards, showing how the Ediswan drawn-wire lamp is a "saving light." The same design is also used for their new price cards.

THE "STANDARD" TRADING CO., 25, Victoria Street, London, S.W.—Leaflet giving particulars and prices of miniature arc lamp ornaments for the watch chain.

MESSRS. SIMPLEX CONDUITS, LTD., Garrison Lane, Birmingham.—Illustrated leaflet, giving prices of insulated lampholders and new Home Office patterns of hand lamps.

THE BRITISH THOMSON-HOUSTON CO., LTD., of Mazda House, 77, Upper Thames Street, E.C., have issued a striking poster relating to the Mazda drawn-wire lamps, of which the principal feature is the Union Jack. The admirable design and artistic choice of colours render this one of the most effective and pleasing posters that we have seen.

Trade Announcements.—THE GENERAL VEHICLE CO., LTD., have removed to Imperial House, Kingsway, London, W.C.

THE BRITISH PROMETHEUS CO., LTD., of Birmingham, announce that until further notice the 10 per cent. advance on list prices, which has been in operation for some time, is now dropped, and prices in all lists are now subject to the usual trade discount.

Market Quotations.—THE BRITISH ALUMINIUM CO., LTD., state that the rates of aluminium ingot and wire are £88 per ton and £112 per ton respectively.

Private Arrangements.—THE HAMBLE RIVER, LUKE AND CO., LTD., The Hamble River, Southampton, electric boat builders, &c.—Pursuant to the provisions of the Companies' (Consolidation) Act, a largely attended meeting of the creditors of the above was held on September 2nd at the Cannon Street Hotel, E.C. A statement of affairs was presented as at August 15th last, and this disclosed ranking liabilities of £16,818. The assets were estimated to realise £25,429, and the estate thus showed an apparent surplus of assets over liabilities of £8,611. Mr. Kemp, the liquidator, stated that it was clear that there was a substantial estate, and in normal times the company would be able to pay 20s. in the £. Under the present circumstances, however, the creditors might have to put up with something less, but, nevertheless, the dividend should be very substantial. The following are creditors :—

General Electric Co.	£105	Silent Elec. Clock Co.	£91
D.P. Battery Co.	83	Pritchetts & Gold, Ltd.	298
Henley's Teleg. Works Co. ..	34	Siemens Bros. & Co.	119
Coventry Chain Co.	29	Worthington Pump Co.	96
Vandervell, C. A., & Co. ..	17	Na'der Bros. & Thompson ..	15
Unbreakable Pulley Co.	26	National Gas Engine Co. ..	16
Elliott Bros.	59	Phosphor Bronze Co.	17

New Cell.—MESSRS. JOHN C. FULLER & SON, LTD., of Woodland Works, Wick Lane, Old Ford Road, Bow, London, E., have devised a new type of "Inert Cell," with special features, which has been purchased by the Admiralty and the War Office in very large quantities. Dry cells are always liable to deteriorate in stock, and in consequence when they are called upon for work after long storage, they may be found in a partially exhausted state. The inert cell becomes a dry cell by the addition of water only when it is required for use, and it, therefore, always starts work as a new battery. The cell which the company are now putting on the market, can be filled in a moment, without fear of spilling the water over the sides of the cell, owing to its great absorbent qualities. Another feature is that when the cell becomes exhausted, additional moisture can be absorbed, and the remaining quantity of oxygen in the manganese can be extracted. After the cell has been filled, it becomes in reality a "dry cell," and can be turned upside down, or left on its side without any fear of fluid exuding.

British Magnetos for British Motor-Cars.—In connection with our recent article under the above heading, we learn that MESSRS. C. A. VANDERVELL & CO., of Acton Vale, well known as makers of motor-car dynamo lighting sets, and who have been, on a more or less large scale, making magnetos for some years, are now concentrating their attention on this branch. According to the *Motor*, the number of different types of magnetos (*i.e.*, of different measurements, and for engines of varying numbers of cylinders) at present used in connection with motor-cars and cycles totals up to just over 60. It will readily be realised that for any one firm to set out to fill these requirements at short notice is practically an impossibility, and in view of this fact, Messrs. Vandervell are at present devoting their energies to the production of nine types of magnetos for motor-cycles, viz., three types for single-cylinder engines, three for opposed two-cylinder engines, and three for V-type twin cylinder engines. These types have been exhaustively tested under varying conditions and are now being constructed in large quantities. At the same time, the firm are proceeding with arrangements for the manufacture of reliable magnetos for four and six-cylinder engines for motor-cars.

Liquidations.—THE MORDEY-FRICKER ELECTRICITY METER CO., LTD.—A meeting of creditors is called for September 12th at 82, Victoria Street, S.W., by the liquidator, Mr. F. Miller, to whom particulars of claims should be sent by October 9th.

H. W. SAMBIDGE & SON, LTD.—A meeting of creditors will be held at 39, Waterloo Street, Birmingham, on October 8th, to hear an account of the winding up from the liquidator, Mr. A. H. Gibson.

RANKINE PATENT FEED WATER FILTER CO., LTD.—A meeting will be held at the offices of Messrs. T. Theodore Rogers Bowler & Co., 30, North John Street, Liverpool, on September 22nd, to hear an account of the winding up from the liquidator, Mr. T. B. Maccabe.

THE CANADIAN ELECTRIC TRACTION CO., LTD.—A meeting will be held at 119, Finsbury Pavement, E.C., on September 30th, to hear an account of the winding up from the liquidator, Mr. E. H. R. Trenow.

Bankruptcy Proceedings.—HERBERT JAMES GODFREY, electrical engineer, late of 188, Balham High Road, S.W.—Receiving order September 1st on debtor's own petition. First meeting, September 15th, at 132, York Road, S.E ; public examination, October 8th, at Court House, Wandsworth, S.W.

J. D. NIXON (J. D. Nixon & Co.), electrical and mechanical engineer, 65, Mill Street, Crewe.—Trustee (F. T. Halcomb, Official Receiver, King Street, Newcastle, Staffs.), released May 21st.

For Sale.—The Corporation of Londonderry offers for sale a quantity of Conradty carbons for open-type arc lamps, particulars of which are given in our advertisement pages to-day.

Book Notice.—"Brown's Marine Electrician for Sea-Going Engineers." By A. E. & A. H. Larkman. Glasgow : James Brown & Son. Price 5s. net.

LIGHTING and POWER NOTES.

Aberdeen.—Annual Accounts.—The accounts of the Corporation electricity department for the year ended July 31st show a net revenue of £4,960 after allotting £16,252 to the sinking fund. £56,809 was realised from the sale of energy, as against £52,875 for the previous year, and the hire of motors brought in £2,889, as against £2,461. On the expenditure side the generation of electricity cost £17,711, against £17,941; 11,693,994 units of electricity were generated, an increase of 889,558 units.

The Corporation Electricity Committee's estimate for the current year is £56,918. It is recommended that the charge for energy to the tramways should be 0·85d. for the first 2,000,000 units, and 0·80d. after 2,000,000.

Altrincham.—Street Lighting.—It has been decided to light Railway Street, Stamford New Road, Kingsway, George Street, The Downs and Ashley Road by electricity. The work is to be put in hand immediately, the L.G.B. having sanctioned a loan of £700.

Atherton.—Loans for Mains, &c.—The U.D.C. has decided to apply to the L.G.B. for sanction to borrow £3,040 for electric lighting purposes, viz., £2,300 for mains, and £740 for transformers and switchgear.

The following scale of charges for electrical energy for power purposes for quantities of 12,500 units and over, per quarter, has been approved of:—12,500 units, ·625d. per unit; 75,000, ·55d.; 125,000, ·50d.; 250,000, ·45d.; 375,000, ·4d.; 437,000, ·37d.; 500,000, ·36d.; 562,000, ·35d.; 625,000, ·34d.

Australia.—Junee. (N.S.W.).—The Municipal Council is considering the question of installing electric lighting.

The Broome (W.A.) Municipality has decided to borrow £8,000 for the purpose of installing electric plant.—*Tenders.*

Warrnambool (Victoria).—The Electricity Committee has recommended the Municipal Council to put in generators at the pumping station and utilise the boilers for generating electricity as well as pumping the town water supply. It is stated that a plant for supplying 95,000 units per annum could be installed for £1,200, and the energy sold at 4d. per unit. The total cost of the installation with mains would be £3,600.—*Tenders.*

Bundaberg (Queensland).—The rights and powers conferred by the Queensland Government on D. S. Finnemore for the supply of electricity at Bundaberg have been transferred to the Electric Light and Power Co. of the same town.—*Tenders.*

Tasmania.—The provisional agreement between the Hydro-Electric Power and Metallurgical Co. and the Government, for the purchase by the latter of the company's Great Lake hydro-electric scheme, has been ratified by the shareholders of the company and by the Legislative Assembly. The purchase price is £190,246. When the Bill came before the State Legislative Council, certain amendments were made, including the elimination of the obligation on the company to construct carbide and metallurgical works at North-West Bay, and the obligation on the Government to supply the company with current for the works, thus making it an agreement to purchase the hydro-electric scheme without hampering contracts.—*Australian Mining Standard.*

The St. Leonard's Council has decided to borrow £5,000 for an E.L. scheme for St. Leonard's, Invermay and Mowbray, for which Mr. A. H. Masters has been instructed to prepare plans.—*Tenders.*

Bacup.—The Electricity Committee considers that it is inadvisable to renew the agreement for the management of the undertaking by Rawtenstall Corporation, which expires on September 30th.

Bishop Stortford.—Plant Installation.—Generating plant is being installed here by the Bishop Stortford, Harlow and Epping Gas and Electricity Co.

Bolton.—New Power Station.—The Chairman of the Electricity Committee (Ald. Longworth) started the new 5,500-H.P. turbine at the new power station, Back-o'-th'-Bank, on September 3rd. The official opening will take place later.

Bradford.—Mains Extension.—Mains are to be extended in various parts of the city at a cost of £807. The Electricity Committee has authorised the laying of mains in five roads for railless trolley routes at a cost of £101.

Continental Notes.—Italy.—A limited company has just been formed at Brescia, Italy, under the style of the Società Anonima Vestonese Elettrotecnica, for the utilisation of local water power for the production of electrical and mechanical apparatus. Its capital is 60,000 lire in 600 shares of 100 lire each.

Crewe.—Street Lighting.—Owing to the shortage of carbons, the T.C. has discontinued the use of arc lamps.

Farnworth.—Loan Sanction.—The L.G.B. has sanctioned the D.C.'s application to borrow £1,900 for additional plant at the electricity works, and £1,500 for mains and services.

Grappenhall.—Prov. Order.—Provided that the proposed charges for electricity are reasonable, the P.C. has decided to support the application of the Warrington Corporation for an extended area of electric supply.

Guiseley.—The Guiseley D.C. has refused the application of the Yorkshire Electric Power Co. for the approval of the Council to the supply of electricity by the company for lighting the district.

Harlech.—The installation of electric lighting was formally inaugurated last week. The promoter of the scheme is Dr. Thomas, Menai Bridge, and the contractors are Messrs. Johnson and Phillips, Ltd., London.

Kirkburton.—Prov. Order.—The Council has decided to support the Yorkshire E.L. Power Co.'s application for lighting powers in the district.

Liverpool.—Proposed Loan.—For the provision of electric mains the Corporation proposes to borrow £40,000.

Llanidloes.—L.G.B. Inquiry.—An inquiry was held last week into the application of the T.C. for power to purchase the local E.L. undertaking for the sum of £400.

London.—Hackney.—The Emergency Committee of the B.C. reports that adequate arrangements have been made to avoid any shortage of the supply of coal to the electricity works, and also that the arrangements as to the supply of arc lamp carbons will cover the Council's requirements for a long time.

The Finance Committee recommends that £15,750, the amount of the loan sanctioned by the L.C.C. for the extension of the generating plant, be borrowed from the London City and Midland Bank, Ltd., at 4 per cent. per annum.

Maidstone.—L.G.B. Inquiry.—An inquiry was held on September 2nd into the application of the T.C. for a loan of £6,316 for new boiler and office accommodation at the electricity works, and mains and services.

Malvern.—Loan Sanction.—The L.G.B. has sanctioned the borrowing of £1,600 for extending the U.D.C.'s electrical plant.

Manchester.—Loan Sanction.—L.G.B. sanction has been received for the borrowing of £10,000 (repayable within 10 years), £28,000 (repayable within 15 years), and £29,400 (repayable within 15 years), for electricity purposes.

Mexico.—With the settlement of Mexico's internal troubles in sight and the resumption of operations in a number of mines in its vicinity, the 50,000-H.P. Santa Rosalia hydroelectric plant of the Mexican Northern Power Co. is now to be pushed to completion. Work on the water-power plant has been suspended since October of last year. Floods during the last 12 months have, however, filled the reservoir until now a body of water 30 miles long by several miles wide has been formed. When the plant was abandoned last fall the hydroelectric machinery had already been installed and the transmission line was nearly completed.—*Electrical World.*

Midhurst (Sussex).—Proposed E.L.—The application of the promoters of the Midhurst E.L. Order, 1914, for powers to erect overhead wires for the supply of electricity has been deferred by the R.D.C. for further particulars.

Nelson.—E.L. Scheme.—The South Wales E.P. Co. are proceeding with the E.L. scheme at Nelson. A sub-station is being erected near Abernant, and poles for the overhead installation are being placed in the streets.

Newcastle Emlyn.—Public Lighting.—The U.D.C. has decided to renew the public lighting agreement with the E.L. Supply Co.

Rochdale.—Street Lighting.—The Tramways Committee has decided to agree to the proposal to light Rochdale Road by means of electric incandescent lamps suspended from the tramway span wires and bracket arms, provided that the Bacup Corporation accepts all liability for increased repairs or alterations to the overhead equipment necessitated by this work.

In connection with the Castleton sub-station, the electricity works manager recommended that a permanent sub-station be erected on land to be rented for a term of years from the Rochdale Canal Co. The Gas and Electricity Committee decided that further inquiries be made as to the leasing of the land.

Rochester.—Street Lighting.—The City Council's Works Committee has approved an agreement with the Kent Electric Power Co. for the lighting of the High Street and North Street.

Royston.—Proposed E.L.—The U.D.C. has referred to the General Purposes Committee an application from the Yorkshire Electric Power Co. for the Council's support to a Bill giving the company power to supply electricity for lighting.

St. Anne's-on-Sea.—Annual Report.—The statement of accounts in connection with the Council electricity undertaking for the year ending March 31st shows a gross profit of £4,449, and a net surplus of £1,183; of this amount £448 has been transferred to the relief of the rates. The gross profit is equal to 8·29 per cent. on the capital employed at the commencement of the year. 1,051,815 units were sold during the year, an increase of 112,472. The difference in the gross revenue, £4,449, against £5,598 the previous year, is due to the reduction in price for lighting and traction.

Salford.—Loan Application.—Application is to be made for sanction to borrow £1,361 in respect of half the cost of erecting and equipping the bulk supply meter house at Pendlebury.

Sheffield.—Mains Extensions and Amalgamation Scheme.—£6,831 is to be spent on mains extensions. A Joint Sub-Committee of the Tramways and Electric Supply Committees recommends the amalgamation of the Kelham Island power station, now under the control of the Tramways department, with the electric supply undertaking, subject to the charge for all energy supplied to the tramway feeders, and for other energy, except booster units, to the extent of 150,000 units per annum, being at a flat rate of ·8d. per unit. This price is subject to a revision at the end of three years. It is not thought advisable to continue to develop the Kelham Island power station as a separate and isolated unit. Should the Council approve this recommendation, the Sub-Committee proposes to appoint Mr. H. E. Yerbury, at present tramways electrical engineer, to the position of deputy general manager and engineer of the electric supply undertaking.

Southend-on-Sea.—L.G.B. Inquiry.—An inquiry was held last week into the application by the T.C. for sanction to borrow £60,000 for the purpose of the electricity undertaking, half that sum being for sub-stations at Leigh and Thorpe Bay, and the rest for additional cables, feeders, &c.

Stamford.—Plant Extension.—The Urban Electricity Supply Co. were to have enlarged their plant, but the 200-kw. dynamo, which was ready for delivery, has been commandeered by the War Office. A new engine had been installed, only needing the dynamo to complete the equipment. A new machine is being built.

Sunderland.—L.G.B. Inquiry.—An inquiry was held on the 4th inst. into the application of the T.C. for a loan of £50,000 for mains, and £13,600 for sub-station machinery and switchgear.

Torpoint.—Public Lighting.—A dispute having arisen between the Electric Supply Co. and the U.D.C. relative to the public lighting, a Committee has been appointed to select an arbitrator to deal with the points raised.

Torquay.—Loan Sanction.—The L.G.B. has sanctioned the borrowing by the T.C. of £5,000 for the extension of the electricity mains, and has intimated that an inquiry will be held into the application for a loan of £16,000 for an extension of the works. The Board does not object to a portion of the work, viz., two water-tube boilers, fuel economiser, and accessories, estimated to cost £4,400, being proceeded with at once.

Wakefield.—Annual Report.—The annual report of the working of the electricity department for 1913 shows a gross profit of £9,848, representing 9·57 per cent. on the capital expenditure. The net profit is £1,712, an increase of £383 on the previous year, whilst the output of energy shows an increase of 17·75 per cent.

Electric light is to be adopted for the public lamps in the Dewsbury Road neighbourhood.

Walmer.—E.L. Scheme.—The U.D.C. on September 3rd decided to co-operate with the Deal T.C. in obtaining from Mr. E. W. Lacey a report on the E.L. question.

Warrington.—Proposed Loan.—The T.C. is seeking sanction to borrow £2,000 for cables.

Wrexham.—Garden Village Supply.—The T.C. has been informed by the B. of T. that it cannot entertain its application for permission to install electric lighting mains to supply the Wrexham Garden Village, and the Council has resolved to arrange for Wrexham Tenants, Ltd., to pay for the cables, and to repay the amount, with 5 per cent. interest, as soon as a prov. order extending the area of supply is obtained, or in any case before December 31st, 1918.

TRAMWAY and RAILWAY NOTES.

Accrington.—Advertising Contract.—The Electricity Committee has decided that it cannot at present accede to a request from Messrs. J. W. Courtenay, Ltd., that their tramcar advertising contract should be suspended until trade is normal again.

Accident.—At a meeting of the Electricity Committee last week, Accrington Tramway Workers' Association asked for compensation for conductor Barnfield, who met with an accident on May 20th. The borough treasurer was authorised to pay Barnfield half wages, and the Association were advised that the accident would not have occurred had the printed rules and instructions been adhered to, and that no compensation would be paid in future under similar circumstances.

Continental Notes.—Italy.—The completion, which has just been effected, of the conversion to electric traction of the trunk line from Lecco to Monza, is only an instalment of the larger scheme for the conversion of the line from Lecco to Milan, which itself is a logical and necessary complement of the Valtellina electric line already working. Realisation of this scheme in its entirety is expected to synchronise with the inauguration of the new railway station at Milan, now under construction. The Lecco to Monza section is 40 km. in length, seven of which, from Lecco to Calolzio, are laid with two sets of rails. The system adopted is three-phase at 15·8 periods. The aerial lines are double, of 200 sq. mm. section. The pressure of supply to locomotives is 3,500 volts. The current is supplied from three power stations owned by private electric supply companies. Some of the machinery and plant is supplied by Italian firms, some by Brown, Boveri & Co., but the major portion has been procured from German firms, through local representatives.

The Italian Council of State, acting on the favourable report of the Superior Council of Public Works, has definitely decided to construct the Central Umbrian Railway from Terni-Todi-Perugia-Umbertide as an electric line. On account of this decision the handing over for working of this line must be postponed for exactly one year. The inauguration, consequently, will take place in September, 1915. Efforts are now being made by the communes interested to obtain the extension of the railway northwards to Forli.

The Società Elettrica Bresciana, whose headquarters are at Brescia, has received Government authorisation to construct and work two new lines of tramway in the city of Mantova, as branches of the existing network.

Doncaster.—The Electricity and Tramways Committee has instructed the tramway manager to prepare specifications for the supply of four new tramcars.

Farnworth.—At the D.C. meeting last week, Mr. Edwardes, manager of the South Lancashire Tramways Co., discussed with the Tramways Committee questions relating to the condition and overcrowding of tramcars. Mr. Edwardes said 20 cars were having new tops put on, and of these 12 were already completed. He assured the Committee he would do everything in his power to keep the cars as clean as possible, having regard to the nature of the traffic.

Leeds.—The Tramways and Electricity Committee of the Corporation has decided to expend £22,000 on the purchase of land between Aire Street and the river Aire, for the purpose of a new electricity generating station, and off Fountain Street, Morley, for the erection of a car-shed and sub-station.

Llandaff.—The District Council on September 2nd decided, subject to certain provisions, to give permission for the Cardiff T.C. to extend the tramways beyond the boundary.

London.—L.C.C.—Electric Tractor.—The London Fire Brigade is at present making some trials of the Lloyd electric tractor, for which Messrs. Mossay & Co., Ltd., Horseferry Road, Westminster, are the British concessionnaires.

Newcastle-on-Tyne.—Annual Report.—The total revenue of the Corporation tramway undertaking for the year ended March 31st last was £261,200, an increase of £22,996 on the previous year. The working expenses amounted to £147,552, an increase of £18,533, leaving a gross profit of £113,648, as against £109,184. After paying interest on loans, £31,256, special rents, £1,567, and income-tax, £3,617, there was a balance of £81,291, an increase of £3,231 on last year. From that £41,450 had been placed to the sinking fund, £12,000 to the relief of rates, and, after meeting other expenditure, there was a balance of £25,134 net profit, which has been carried to the reserve and renewal account.

Salford.—The T.C. proposes to borrow £1,200 to cover the cost of laying a double line of tramway in Camp Street, Broughton. Owing to circumstances caused by the war, the Tramways Committee has agreed to forgo the payment to the Corporation by the Bell Punch and Printing Co. of £3 10s. per million tickets supplied to the Corporation in respect of the use of the advertising spaces on the tickets, until further notice.

Torrington-Halwill.—The B. of T. has granted an order for the construction of a light railway from Torrington to Halwill.

TELEGRAPH and TELEPHONE NOTES.

A Secret Wireless Station.—According to a *Daily Chronicle* correspondent at Milan, Mr. Marconi, whilst in Rome last week, discovered, by means of an improved direction finder which he has devised, that a high-power wireless station had been secretly installed in the headquarters of a foreign religious order in Rome. The apparatus was capable of communicating with long-distance stations in other countries. The Italian Government raided the premises and destroyed the installation.

Australia.—As the result of conferences between the Postmaster-General and the Australian representative of the Marconi Wireless Telegraph Co., the long negotiations between the company and the Commonwealth Government with respect to patent rights have come to a successful termination, and the Balsillie system, which has become the property of the Government, is to be recognised as a legitimate rival to the older systems. The effect of the agreement arrived at is that the Marconi Co. discontinues its action against the Commonwealth and withdraws its opposition to the Balsillie system. The Commonwealth undertakes to pay £5,000 to the Marconi Co. in consideration of licences being granted to the Commonwealth to use the Marconi patents in Australia, and for the purpose of communicating with New Zealand. The Postmaster-General regards the results of the negotiations as very satisfactory. The action might have cost £20,000 in legal expenses. There is to be no payment in cash to the Amalgamated Wireless, Ltd. (the Australian company operating the Telefunken and Marconi patents), but this company has undertaken not to attack the validity of the Balsillie system. In addition the payment of a royalty of £1,000 for Marconi installations on the ships of the Australian Navy now ceases.—*Australian Mining Standard.*

Denmark.—A central office has been opened at Copenhagen for neutral telegrams, and for the private exchange of telegrams of countries between which direct telegraphic communication is interrupted, subject to the censorship of the Danish Government. Personal and private messages will be transmitted, but no telegram in code or of a political nature, and no Press messages will be accepted.

Pacific Cable Cut.—The cable has been cut at Fanning Island by the German cruiser *Nürnberg*, which the cruiser *Australia* is reported to be chasing. The enemy was flying French colours, and thus was able to land a force unopposed and cut the cable.

United States.—The Navy Department has taken over the wireless station of Tuckerton, which will be operated on equal terms by representatives of belligerents and neutrals under strict censorship.

CONTRACTS OPEN and CLOSED

OPEN.

Australia. — Sydney. — September 30th. Telephone instruments and parts, for the Postmaster-General. See "Official Notices" August 21st.

October 7th. Telegraph instruments, measuring instruments, incandescent electric lamps, switchboard parts, for the Postmaster-General. See "Official Notices" August 28th.

October 12th. Vacuum cleaning plant and motor-driven air compressor, for the Sydney Municipal Council.

Tenders are to be invited by the Sydney Municipal Council Electricity Committee for the installation of a battery-charging plant at the Council's motor garage, also for two potential-transformers with four ratios to 100 volts, two standard current-transformers for use on circuits up to 12,000 volts, 50 cycles, ratio, 2,500 to 5 amps.; two low-reading dynamometer type voltmeters, double range, 1·5 to 7·5 and 3 to 15 volts; one Campbell mutual-inductance standard bridge and detector; 1,500 steel cross-arms; potentiometer for calibration and testing purposes; two 500-kw., 33,000/5,000-volt, three-phase transformers, required for supplying the North Shore municipalities.—*Tenders.*

Melbourne.—Victorian Railways Department. October 7th. Motors and switchgear, and motor-driven air compressors for the Ballarat and Bendigo workshops.

October 12th. Three-phase motors for workshop machinery, for Melbourne Suburban Railways. See "Official Notices" September 4th.

Tenders are to be invited for the construction and equipment of the Burwood to Melbourne electric tramway. Messrs. McCarty, Underwood, Consulting Engineers.—*Tenders.*

Kalgoorlie.—Five-ton electric wagon, for Municipal Council. Specifications, &c., may be seen at the Commercial Intelligence Branch of the Board of Trade.

Adelaide. — October 28th. Telephones and flexiphones, telephone instruments and parts, for the Postmaster-General. See "Official Notices" to-day.

Perth. — November 18th. P.M.G.'s Dept. 249 accumulators with assorted apparatus, for telegraph office, Norseman.—*Tenders.*

Brisbane. — December 15th. Switchboard, common battery, automatic or semi-automatic, for the Postmaster-General. See "Official Notices" to-day.

Bacup.—A sub-committee of the T.C. has been ordered to obtain tenders for service cable for immediate requirements and stock.

Burnley. — September 21st. Guardians. Electrical goods and the performance of electrical work during the next half-year.

Eccles.—September 21st. Coal elevator and conveyor at the electricity works, Cawdor Street, Patricroft. Specifications, &c. (£1 1s.), from the Borough Electrical Engineer.

Leith.—September 14th. Corporation. Supply of 8,000 tons washed singles during a period of 12 months, or 3,500 tons washed singles during a period of three months for the electricity department. Specifications from the Burgh Electrical Engineer, Gt. Junction Street.

Limerick.—September 18th. Corporation. One three-cylinder Diesel oil-engine coupled to a 160-kw. d.c. generator; one motor-driven air compressor. See "Official Notices" September 4th.

Liverpool.—September 15th. Electric supplies for six months, for the West Derby B.G. Mr. H. P. Cleaver, Clerk, Brougham Terrace.

London. — L.C.C.—September 28th. Installation, 215 wiring points, 285 lighting points, at Gifford Street Elementary School, Caledonian Road, N. See "Official Notices" to-day.

September 22nd. Induced-draught fans, motors, spare parts and dampers, also alteration of flues and moving of dampers at the generating station, Greenwich. See "Official Notices" August 28th.

St. Pancras.—September 21st. Electric lift for heavy vehicles, for the B.C. See "Official Notices" August 28th.

Middlesbrough.—September 12th. Corporation. Three electric motor-driven sewage pumps, priming pumps, metering arrangement, pipework, overhead travelling crane. See "Official Notices" August 14th.

South Africa.—Johannesburg.—October 9th. Ten single-truck double-decked electric tramcars, for Municipal Council. Specifications, &c., may be seen at Commercial Intelligence Branch of Board of Trade.

Spain.—October 9th. The Spanish Ministry of Public Works in Madrid is inviting tenders for the concession for the construction and working of an electric tramway in the town of San Sebastian (Province of Guipuzcoa).

September 19th. The municipal authorities of Posadas (Province of Cordoba) are inviting tenders for the concession for the electric lighting of the town during a period of three years.

Walsall.—September 29th. Corporation. Extra h.t. switchgear, static transformers, l.t. switchgear. See "Official Notices" to-day.

Warrington.—September 11th. Education Committee. Wiring, &c., at the Evelyn Street Council School. Mr. J. Moore Murray, Secretary and Director, Education Office, Sankey Street, Warrington.

September 15th. Twelve months' supply of earthenware conduits for Tramways Committee. See "Official Notices" August 28th.

Whitby. — September 30th. U.D.C. Construction of cliff tramway or lift. Particulars from the Clerk to the Council.

CLOSED.

Australia.—The following tenders have been accepted:

Postmaster-General's Department, Melbourne:—

100 miles twisted-pair wire, £14 2s. per mile; 15 tons outside distributing ditto, £150 17s. 4d. per ton.—W. T. Henley's Telegraph Works Co., Ltd.
Miscellaneous telephone material.—Noyes Bros. Pty., Ltd.
3 miles tinned-copper wire, £42 10s.; 2 tons h.d. copper wire, £100 per ton.—Callender's Cable and Construction Co., Ltd.
10 tons tinned-copper wire, £127 17s. per ton; 1 ton copper-clad wire, £69 8s. 6d.; also sleeves, tapes, &c.—F. Vanderkelen & Co.
90 tons bronze wire, £89 2s. 6d. per ton.—Gibbs, Bright.
Automatic switchboard apparatus for Geelong P.O., £3,000.—Automatic Telephones (Aust.), Ltd.

South Australia:—

15 c.b. switchboards, £63 15s. each; 5 ditto, £43 7s. 2d. each; 5 non-multiple magneto switchboards, 100 lines, £41 15s. each; 10 ditto, 25 lines, £15 each; 20 ditto, cordless, 10 lines, £8 10s. each.—J. Bartram & Son Pty., Ltd.
11,000 insulator spindles, 9½d. each.—A. Simpson & Son.

Sydney Municipal Council:—

Time switches, £208.—British General Electric Co., Ltd.
Watt-hour meters, £240.—Aus. General Electric Co.

Werribee Shire Council:—

Suction gas engine, £1,029.—R. Hornsby & Son, Ltd.
Dynamo, booster, pump and motor, switchboard, storage battery, cells, and power-house wiring, £1,924.—Sutherland & Ashman.
Conductors, insulators, meters, &c., £609.—Grant & Vincent.

—*Aus. Mining Standard.*

Western Australian Tender Board:—

Insulated wire cable, Railway Department: No. 1, £275 per mile; No. 2, £150 per mile.—J. R. W. Gardam.

Kempsey Municipality, N.S.W.:—

Town electric lighting.—Kynoch & Co.

Sydney Municipal Council.—The following tenders were received by the Electric Lighting Committee :—

Meters.—Landis & Gyr, Ltd , £2,832, alternative £3,177; B.I. and Helsby Cables, Ltd., £2,766; W. G. Watson & Co., £4,796, alternative £6,319, £6,419, £1,584; British General Electric Co., £5,013; Aust. Metal Co., Ltd., £8,827; Lawrence & Hanson, Ltd., £5,514; Aust. General Electric Co., £5,737; Edison & Swan Co., Ltd., £5,869; Noyes Bros., £5,966; Hayes & Eggers, Ltd., schedule; India-Rubber Co., Ltd., schedule; Standard Waygood Hercules, Ltd., schedule.
Feeder cables (D.C.).—Siemens Bros., £10,521; B.I. and Helsby Cables, Ltd., £10,638; W. T. Henley's, Ltd , £11,070; Noyes Bros., £11,112; Union Cable Co., Ltd., £11,719; Western Electric Co., £11,315; Aust. Metal Co., £11,792; N. Guthridge, Ltd., £12,257; Lawrence & Hanson, Ltd., £14,407.
Box compound.—W. T. Henley's, Ltd., £55; W. G. Watson, Ltd., £78, alternative £87; Siemens Bros., £90, alternative £88; Western Electric Co., £95; B.I. and Helsby Cables, Ltd., £168.
Maximum-demand indicators.—B.I. and Helsby Cables, £137; Aust. G.E. Co., £315; British G.E. Co., schedule; W. G. Watson & Co., Ltd., £364; Noyes Bros., £532.
Insulators (H.T.).—Lawrence & Hanson, portion, £22; Aust. Metal Co., Ltd., £330, alternative £333, £403; Warburton, Franki, Ltd., £468; Aust. General Electric Co., £608; Noyes Bros., schedule.
Insulators (straight stem).—India-Rubber and Gutta-Percha Co., £154; T. Zwicker & Co., £85; W. G. Watson, Ltd., £150; Siemens Bros., £160; Lawrence & Hanson, Ltd., £161; Aust. Metal Co., Ltd., £181; Noyes Bros., £200; Aust. G.E. Co., £245.
Insulators (33,000-volt).—Aust. Metal Co , Ltd., £1,350; Warburton, Franki, Ltd., £1,604; Aust. G.E. Co., £1,095; R. Bryce & Co , Ltd., £2,078; W. G. Watson, Ltd., £2,140; Noyes Bros., schedule.
Carbons.—Aust. Metal Co , £2,869; Union Electric Co., £5,724; Siemens Bros , yellow flame, £6,204, white flame, £7,780; Edison & Swan, Ltd., £6,697; W. G. Watson, Ltd., schedule; Crompton & Co., Ltd., schedule; Aust. Otis Engineering Co., schedule.
Induced draught fans.—H. P. Gregory & Co. (fans only), £2,218; Noyes Bros., £3,625; Ferrier & Dickenson, £5,700; N. Guthridge, Ltd., £5,651, alternative, £5,504, £6,831, £5,284; Falkiner Electric Co., £3,147.

The Electricity Committee has made the following recommendations :—

That the tender of Messrs. Babcock & Wilcox, at £3,795, be accepted for a coal conveyer at the power house, and that of the Aust. General Electric Co. for 33,000-volt transformers and switchgear, at £4,287.
That the following equipment for the Parramatta Road station be obtained from the Aust. General Electric Co., at £1,474, viz., one 5,000-v. transformer panel, £147 10s ; one 10,000-v. ditto, £247; two 33,000-v. feeder panels, £671; two lightning arresters, £108 10s.
For the switchgear required for the refrigerating plant at the abattoirs, the Public Works Department having decided to take energy from the City Council, one 33,000-v. feeder panel, £335 10s.; three 33,000-v. transformer panels, £806; two 33,000-v. aluminium lightning arresters, £408 10s.; three 5,000-v. transformer panels, £346 10s.; four ditto, £462; sixty 5,000-v. bus-bar insulators, £15; seven marble panels, £175.—Aust. General Electric Co.
Four 2,000-K.V.A. 33,000/5,000-v. three-phase transformers for the abattoirs sub-station, at £5,200.—Messrs. Siemens Bros.
That a Lea recording instrument for No. 12 turbine be obtained from Messrs. W. Adams & Co., at £150.

Melbourne City Council :—

C.I. service and cut-out boxes: group No. 1, £219 11s. 8d.; ditto, group No. 2, £289 16s.; group No. 3, £46 6s. 4d.—Cleveland Eng. Co.
Condenser, fuses and transformer blocks, £320.—John McIlwraith & Co. Pty., Ltd.

Sydney Metropolitan Board of Water Supply and Sewerage :—

Recording ampere-meters.—Aust. General Electric Co., £200.
Electric air-drill and pulsator.—Ingersoll Rand Co., £267.

—Tenders.

Postmaster-General's Department, Sydney :—

91,000 insulators, porcelain, £910.—India-Rubber, Gutta-Percha and Telegraph Works, Ltd.
1,800 yards waterproof cloth, £810; 70 yards ditto tubing, £10 10s.—Dunlop Rubber Co. of Australasia.
100 miles copper wire, No. 18, £787 10s.—Noyes Bros. (Sydney), Ltd.
2 miles copper wire, No. 22, £6 19s. 6d.; 300 miles twisted-pair wire, for outside distributing, two No. 18, £4,222 10s.; 100 miles ditto, ditto, two No. 16, £20 10s.—W. T. Henley's Telegraph Works Co., Ltd.
2,000 Hellesen dry cells.—Messrs. W. G. Watson & Co., £208 6s 8d.
Equipment and material for the extension of the Toowoomba telephone exchange.—Western Electric Co. (Australia), Ltd., £203.

Postmaster-General's Department, Melbourne :—

62,500 copper binders, £89 16s. 11d.; 112,000 ditto, £287; 47,000 ditto, £120.—India-Rubber, Gutta-Percha and Telegraph Works, Ltd.
20 tons copper H.D. wire, 100 lb. mile, £1,668; 5 tons ditto, 150 lb. mile, £391 10s.; 260 tons ditto, 200 lb. mile, £19,675; 270 tons ditto, 300 lb. mile, £21,141; 50 miles tinned-copper wire, £175; 100 miles ditto, £282 10s.; 50 miles two-twisted conductor wire, £243 15s.—British Insulated and Helsby Cables, Ltd.
72,000 porcelain insulators, £1,762 10s.—Dalgety & Co.

Postmaster-General's Department, Adelaide :—

23 switchboards, 10 lines, £453 15s.; 25 ditto, 6 lines, £276 13s. 4d.—J. Bartrams & Son Pty., Ltd.

Victorian Railways Department :—

Galvanised telegraph wire, No. 8, £9 8s. 6d. per ton.—Briscoe & Co., Ltd.

N.S.W. Public Works Department :—

Switchboard for Hawkesbury Agricultural College, £394.—Aust. General Electric Co.
Transformers at ditto, £110 15s.—Noyes Bros. (Sydney), Ltd.
Ditto, £118.—Aust. General Electric Co.
13 electric motors at ditto, £368 12s.—Union Electric Co. of Aust., Ltd.

Rodney.—Victoria Shire Council has accepted the following tenders for plant in connection with the electric lighting scheme for Mooroopna :—

48-H.P suction gas plant.—R. Hornsby & Sons, £604.
Generators, boosters and motor.—Aust. Metal Co., £273.
Storage battery, £389, fuse boxes, £15, street lights, £48.—Silvertown Co.
Meters.—Aust. Metal Co.
70 insulators.—Noyes Bros.. £14.
H.D copper cable.—B.I. & H. lsby Cables, £176.
Insulated cable.—Henley's Telegraph Works, Ltd., £30.
Poles.—W. J. Heath, £167.

—Tenders.

Launceston (Tasmania).—The City Council has accepted the offer of Messrs. H. Jones & Co., Hobart, for the following tramway rails and accessories :—

240 tons No. 1 B.S.S. 90-lb. rails, £7 12s. 6d. per ton; 80 tons No. 1 C.S. 96-lb. rails, £8 2s. 6d. per ton; 350 pairs fish-plates, 4s. 7½d. per pair; 1,332 fish-bolts, £1 8s. 2½d. per 100.

Bacup.—The Electricity and Tramways Committee has accepted the tender of Messrs. Chas. Macintosh & Co., Ltd., for distributing mains.

Buxton.—The U.D.C. has accepted the tender of Messrs. Day & Ferguson, of Buxton, for coal for the electricity works.

Dartford.—The U.D.C. has accepted the following tenders for coal for the electricity works :—

J. Waddell & Sons.—200 tons of Mansfield rough slack, 16s. 6d. per ton.
J. Hudson & Co., Ltd.—2,000 tons South Hetton rough small, 15s. 2d. per ton, and 2s. per ton to cover insurance against war risks as long as is necessary, and 100 tons Shipley slack, 16s. 6d. per ton.

The Council has also arranged with Messrs. E. J. and W. Goldsmith, to keep at New Wharf 500 tons of rubbly culm coal.

Messrs. Browett, Lindley & Co., Ltd., have been requested to replace the uniflow engine with a triple-expansion engine of their best and most economical design.

Derby.—The T.C. has accepted the tender of Messrs. W. A. Boissier & Co. for wiring the Market Hall shops for electric light, at £58 11s. 6d., and that of the Rees Roturbo Co. for a boiler feed pump.

Dewsbury.—The Electricity and Tramways Committee has accepted the tender of Messrs. Crawshaw & Warburton for nine months' supply of coal.

Eccles.—The Electricity Supply Committee has accepted the tender of the Earl of Ellesmere for an annual supply of slack at 10s. 9d. per ton.

Holywell.—The B.G. has accepted the tender of Messrs. Sibcon Bros. for the erection of an electric power house.

London.—Wandsworth.—The Guardians have accepted the tender of Messrs. Siemens Bros. & Co., at £74, for providing an additional internal telephone exchange at the St. James's Infirmary.

Manchester.—The Tramways Committee has placed an order with the Daimler Co., Ltd., Coventry, for six motor-'bus chassis to replace those which had been impressed by the military authorities. The tender of Messrs. Davis, Lowe & Sons, Ltd., Manchester, for cast-iron pipes for heating purposes, has also been accepted by the Tramways Committee.

The Electricity Committee has ordered a contract for Sections C and D, and portion of Section E, for a 5,000-KW. turbo-alternator at Stuart Street, with Messrs. Mirrlees, Watson & Co., Ltd., Glasgow, to be prepared and sealed.

The tenders of Mr. R. Carlyle, Old Trafford, and Messrs. J. Gerrard & Sons, Swinton, for rebuilding warehouse and repairs to roof at the Dickinson Street station, have been accepted by the Electricity Committee.

The Electricity Committee has also accepted the tender of Messrs. W. T. Glover & Co., Ltd., for a supply of cable, and the following tenders for supplies :—

Oils.—M. Wells & Co., Manchester; C. C. Wakefield & Co., London; Hy. Wells & Co., Salford; Spurrier, Glazebrook & Co., Ltd., Manchester; and Price's Oil Co., Ltd., Manchester.
Carbon brushes.—Le Carbone, and Morgan Crucible Co.
Insulated wires.—Liverpool Electric Cable Co., Ltd.
Flexible conductors.—Chas. Macintosh & Co.
Binding and fuse wires.—I.-R., Gutta-Percha, &c., Co., Ltd.
Incandescent lamps (metal filament).—British Thomson-Houston Co., Ltd.
" " (carbon filament and radiator).—Siemens Bros. Dynamo Works, Ltd.
Fuse boxes.—B.I. and Helsby Cables, Ltd.
Motors.—Siemens Bros. Dynamo Works, Ltd.; Electric Construction Co , Ltd.; Electromotors, Ltd.; British Westinghouse Electric and Mfg. Co., Ltd.; and E. Brook, Ltd.
Motor starters.—Veritys, Ltd.; Ferranti, Ltd.; and G. Ellison.
Meters.—Ferranti, Ltd., and Chamberlain & Hookham.
Current and potential transformers.—Ferranti, Ltd.

Rotherham.—The Corporation has accepted the tender of the Bastian Meter Co., Ltd., for the supply of Bastian meters from 2½ to 5 amperes.

Messrs. Chamberlain & Hookham, Ltd., have also received a Corporation contract for meters.

Stretford.—The tender of Mr. Robert Carlyle has been accepted by the U.D.C., at £325, for extending the battery room at the electricity works.

NOTES.

Bradford Electrical Exhibition.—As already stated in our pages, this exhibition has been postponed. Mr. Thos. Roles has written advising us that a meeting of the Bradford Corporation Exhibition Sub-Committee held on September 8th, the following resolution of the Executive Sub-Committee was approved :—"In consequence of the unsettled condition of the country, due to the present European War, the Executive Sub-Committee deem it inexpedient to proceed meantime with the organisation of the Bradford Electrical Exhibition, and recommend that the enterprise be postponed for the present, but that the Sub-Committee be authorised to continue the organisation of the Exhibition at the earliest favourable moment."

The Board of Trade and German Capital.—In response to inquiries made just before going to press, Mr. Runciman, President of the Board of Trade, has courteously informed us that he hopes very shortly to make an announcement on the subject of trading with British firms operating in England whose capital is owned, either in part or entirely, by German subjects.

In view of the foregoing statement the following letter received from a correspondent leads us to the belief that while the Government finds it necessary to act with deliberation, the Association mentioned has seen fit to take, at any rate preliminary measures, with precipitancy :—

THE STATE OF WAR.

Herewith I send you copy of a circular letter received from the British Electrical and Allied Manufacturers' Association, together with a copy of the "Resolutions of Council" referred to therein. This appears to me to be a most ill-conceived and short-sighted move.

London. "FORE-SIGHT."

Dear Sir, STATE OF WAR.

The resolutions, of which a copy is handed to you herewith, were passed at a Council meeting here last afternoon, and I am to request you to inform me on or before 9th inst. whether you assent to them.

(Signed) D. N. DUNLOP,
Secretary, British Electrical and Allied Manufacturers' Association.

London, *September 5th*, 1914.

1. Resolved, that having regard to the state of war, it is the opinion of this Council that trading with

(1) Any company incorporated in Great Britain the controlling interest in the share capital of which is held by Germans or Austrians ;

(2) Any German or Austrian firm or branch or agency of German or Austrian firm trading here, whether in the same or in another name,

Is against the best interests of the British electrical and allied industries.

2. Resolved that the secretary be, and he is hereby instructed, to invite members of the Association who fall under definition (1) or (2) in the first resolution to resign their membership.

3. Resolved that members of the Association be instructed that in the opinion of this Council it is against national interests for them to buy from or sell to firms falling under definitions (1) or (2) in the first resolution.

Siemens's Employés at the Front.—In view of the attacks that have been made upon the Siemens companies, it is of interest to note that altogether 723 of their staff and employés have joined the colours as reservists, territorials, or volunteers. The Stafford works and offices alone have contributed over 400. The place of every man is being kept open for him. Full wages are to be paid to married men and half wages to single men serving with the colours.

Safety-First Rules for the Electrician.—At the recent convention of the South-Western Electrical and Gas Association at Galveston, Texas, F. N. Lawton, manager, Wichita Falls Electric Co., stated that this company had prepared the following rules for men engaged in electrical work :—

SWITCHBOARD INSTRUCTIONS.

Safety First.—Remember your family and protect your fellow workmen.

When operating the switchboard always stand on the rubber mat.

When throwing the switches, use but one hand.

When necessary, use rubber gloves, hanging upon the board.

Keep the board well lighted. Have oil lanterns always ready.

In case of fire open your exciter switches first, then use sand.

Report the slightest signs of trouble on the board.

Keep instruments and wiring all clean.

Use danger card when circuit is off for repairs or trouble.

Report all trouble on station log.

Watch temperature of oil in constant current regulator.

When working on back of board use wooden stool and rubber gloves.

LINEMAN INSTRUCTIONS.

Safety First.—Remember your family and protect your fellow workmen.

Learn the position of all circuits and wires upon the poles.

Use your rubber gloves in handling all wires. They may be alive.

Take the safest position on the pole.

Keep yourself free from grounds. Watch out for telephone cables and messenger wires.

In coming down a pole, watch out for street signs fastened to the pole.

In using tools on a pole, keep the groundmen away from the pole.

In making wire connections, use but one hand at a time. Don't get in circuit.

Constantly inspect lines for trouble. Keep all primaries clear.

Put away all tools at the end of the shift.

Keep your spurs, body-belt and all tools in good condition.—*Elec. Review and W. Electn.*

Bosch Magneto Co.—The Bosch Magneto Co., Ltd., and Mr. John A. Stevens, of Tottenham Court Road, one of the officials, have been fined £8 4s. (including costs) for refusing to allow Mr. J. Scott, solicitor, of Arthur Street, W.C., to inspect the register of shareholders on August 23rd, and for refusing Mr. F. C. Borer an inspection of the register on August 26th. When the complainants were able to see the register they found that of the 50,000 shares of the company only two were held by Englishmen and the remainder by Germans.

The I.E.E. and the War.—We understand that in response to the notice issued to the members of the Institution of Electrical Engineers a month ago, 1,450 offers of service were received, and after classification the names were placed at the disposal of the War Office, the Admiralty, and other Government departments, and of the electricity supply undertakings of the United Kingdom ; some vacancies in the last named have already been filled from the names sent to the Institution.

There was, however, evidence of a desire on the part of many to give more than "spare time" services to their country, and we have received from the Institution the following information :—

"A large number of the members of the engineering profession having expressed the wish to be allowed to serve their country together in one regiment or battalion, the Institutions of Civil, Electrical and Mechanical Engineers have under consideration the formation and training of a battalion enlisted from among their members, with a view to its forming part of Lord Kitchener's Army."

We commend this admirable proposal to the notice of our readers ; many will, no doubt, have already enlisted, but we believe they will have little difficulty in exchanging into the new battalion, and we feel sure that there will be no lack of recruits for service as members of that body.

Appointments Vacant.—The Hackney B.C. electricity department recommends that as the new plant and sub-stations will shortly be running, an additional generating engineer be appointed at £120 + per annum.

Trade Returns in War Time.—THE AUGUST FIGURES : FOREIGN TRADE.—The following are the electrical machinery figures given in the official returns for August :—

IMPORTS.	*Month of August.*	*Inc. or dec.*	*Eight months, 1914.*	*Inc. or dec.*
Electrical goods and apparatus, excluding machinery and uninsulated wire ...	£ 37,451	£ − 82,657	£ 981,442	£ − 7,483
Machinery	308,299	−222,353	5,085,575	+163,241
EXPORTS.				
Electrical goods and apparatus, excluding machinery and uninsulated wire ...	145,683	− 139,508	2,204,317	−1,272,768
Machinery ...	...1,708,073	−1,177,701	24,482,516	+ 40,513

Stealing Electricity.—On August 28th, at Brighton Police Court, Rose Roper, of 14, Grand Parade, was fined 40s. and costs for fraudulently stealing and consuming certain electricity on July 27th. It was stated that the meter was a 1s. in the slot one, and it had been bridged in such a way that a certain amount of the electricity passed through, but the bulk passed over and was not registered at all.

Fatalities.—Joseph Yorke, 50, a married man, was preparing to clean the roof of a cupola at the Coalbrookdale Works on Saturday, and when he was in the act of throwing a rope to his fellow workmen below, his hand, unfortunately, came in contact with a live electric wire. The result was that his wrist was severed, and he was instantly killed.

An electrician named Reginald Harris, aged 25, employed in Chatham Dockyard, fell from a trestle on which he was standing, and, when picked up, was found to be dead. At first it was thought his death was caused by an electric shock, but the evidence at the inquest on Saturday showed that it was due to the extreme heat from several furnaces in operation in the smithy. A verdict in accordance with the evidence was returned.

John Parker Treeby, a young electrical engineer employed by Messrs. Ferranti, Ltd., Hollinwood, was killed last week whilst cycling to his work, through colliding with a motor-car. At the inquest a verdict of "Accidental death" was returned.

Educational Notes.—We have received from UNIVERSITY COLLEGE (University of London) the Handbook of the Faculty of Engineering and special programmes of courses arranged for engineers in practice for the forthcoming session. Copies can be obtained from the Secretary. The 1914-15 Session begins on October 5th.

BOROUGH POLYTECHNIC INSTITUTE.—The Institute reopens on September 21st for students of Electrotechnics. Particulars are given in our advertisement pages to-day.

CITY AND GUILDS TECHNICAL COLLEGE, Leonard Street, E.C. —The Entrance Examination for students who have not matriculated will be held on September 22nd.

WEST HAM MUNICIPAL TECHNICAL INSTITUTE. — Electrical Engineering Department. The 1914-15 Session opens on September 21st.

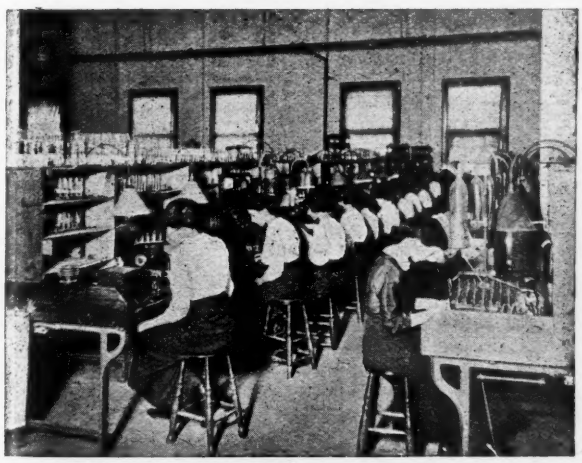
Inquiries.—A correspondent wants information regarding a "Wireless Light"—a bulb on a sheet of plate glass, which lights up intermittently and has no visible communication with the mains.

British makers of Water-jet Lightning Arresters are asked for.

British Half-Watt Lamps.—We recently enjoyed the privilege of inspecting the works where the British Thomson-Houston Co., Ltd., make their half-watt lamps, at Rugby. We call it a privilege advisedly, for not only is it, we believe, altogether exceptional for any person other than the staff to be accorded admission to that jealously-guarded department, but also we derived keen pleasure and satisfaction from what we saw. The department is run on lines which were to us entirely novel, and which we believe to be unique as regards the treatment of the employés, most of whom, as is usual in lamp works, were girls (as a matter of fact, the Army has drawn heavily upon all the company's works, more than 50 per cent. of the men of fighting age and fitness having joined the coloure). Without entering into details at this time, we may say that the greatest pains are taken to employ only girls of superior class and ability, and no less care is taken to retain their services when trained; individual attention is bestowed upon each employé, and handsome rewards are offered for increased output, enabling good workers to command comparatively high wages—not only for a time, but permanently. A premium is set also upon good work, with the result that the percentage of throw-outs at every stage of the manufacture is insignificant—a feature of importance in lamp making. Special precautions are also taken to safeguard the health of the workers; the enormous number of blow-pipe gas flames employed in the joining and sealing of the glass parts, and for other operations, tends to vitiate the air, and to prevent this large air trunks have been provided, with ventilating fans to draw off the products of combustion. A convenient "rest room" has also been set apart and fitted with all appliances necessary for the restoration of tired or ailing humanity.

As for the manufacture of the Mazda half-watt lamp, it is one of the most interesting series of processes that we have ever seen. As in so many other industries, attention to detail is of the first importance, and an apparently trifling feature may prove to be essential to success. The filaments are made of tungsten wire produced from the ore at the Rugby works, where also all the wire required is drawn.

Although the production of tungsten wire in the first instance necessitated so long and costly a research, it is now drawn with the greatest facility and in enormous continuous lengths, so perfectly uniform in section that if it were necessary, the lamps could be made of correct wattage and candle-power without submitting them to any electrical test. The wire is so strong and yet ductile, that it can be spiralled cold round a wire of its own diameter to make the "coiled filaments" which characterise the half-watt lamp, without fear of cracking or breakage. The filaments are mounted on spiders of special design to withstand the



Filament Shaping and Mounting.

high temperature of the filament, and a mica shield prevents convection currents in the gas from overheating the neck; but the very long necks considered necessary by foreign makers have been found useless, and have been abandoned by the B.T.H. Co. Numerous special machines, of highly ingenious design, have been evolved by the company's staff as a result of patient and enduring effort, which very greatly simplify the manufacture and improve the products, and no detail of manipulation is considered too insignificant to receive minute attention, with the result that the output has been immensely increased without corresponding additions to either plant or personnel—though, of course, both these are being extended to cope with the rapidly growing demand. Life tests are constantly in progress, and the only trouble in this respect that appears to perplex the makers is the fact that the lamps last too long—renewals are too rarely needed. The exhaustion of the half-watt lamp has to be carried to an extremely high degree before admitting the inert gas, and for this reason the installation of pumping plant is exceptionally elaborate. The gas in the lamps when hot is at a pressure slightly below atmospheric, so that if a bulb is accidentally broken there is no risk of glass being thrown outwards by explosion. Owing to the fact that no deposit occurs on the bulb except at the neck, the candle-power of the lamps hardly ever diminishes appreciably—certainly not to the 80 per cent. standard, which is usually regarded as marking the limit of useful life.

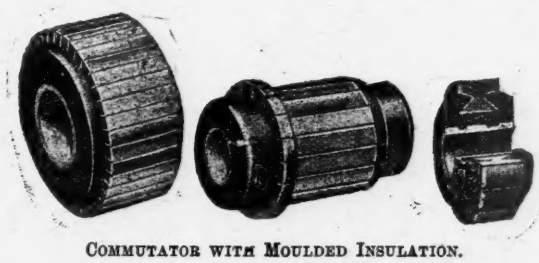
The manufacture of the ordinary Mazda tungsten wire lamps and of carbon-filament lamps, as carried on at Rugby, is only less interesting than that of the half-watt lamp; readers may be surprised to learn that the carbon lamp still has so many applications, that more lamps of this type are now being made than at any previous period in the company's history. But we are mainly con-

Sealing-In Mazda Half-Watt Lamps.

cerned here with the half-watt Mazda lamp, which, as we can personally vouch, is made throughout at the Rugby Works, with British labour and materials.

Certain new developments in connection with both the half-watt lamp and the ordinary Mazda drawn-wire lamps, though extremely interesting, we must leave until the time is ripe to deal with them. Our illustrations show the processes of shaping and mounting the filaments, and sealing them into the bulbs.

Commutator with Moulded Insulation.—In a test recently carried on by the United States Light and Heating Co., Niagara Falls, N.Y., with an automobile starting motor having its commutator built up with "bakelite" moulded insulation, a speed of 9,060 R.P.M. was attained before the commutator failed. As the maximum speed at which such a commutator is operated in actual service is usually about 3,500 R.P.M., the factor of safety indicated in the above test was approximately 6·7. The type of commutator tested is shown in the accompanying illustration. This commutator has a total weight of 8·46 lb. and an outside



Commutator with Moulded Insulation.

diameter over the tangs of 13·375 in. When tested the tangs were removed so that the commutator then weighed 7·06 lb. and had an outside diameter of 10·375 in. This is the diameter at the commutator face. In order that the commutator, while being tested, should approach service conditions as to temperature, it was heated to 265° F., this temperature being somewhat higher than that which would occur in actual service. Calculations show that the disrupting force—that is, the force tending to pull the commutator apart—was 15,230 lb. per sq. in.—*Electrical World.*

Lightning in Australia.—The *Sunday Times*, of Western Australia, gives an account of a violent thunderstorm at the Ironsides North Mine at Boulder. The mine has, or had, an iron smoke stack 45 ft. high made of ½-in. plating, and 4 ft. in diameter, which attracted the lightning. "It was struck near the base, and the electric fluid appeared to traverse the whole length, shearing off fully 20 ft. This seemed to be literally hurled into the air, crashing on to the top of the winding engine room, to which it did considerable damage—naturally." For some minutes after the lower portion of the stack was red-hot, the rain falling on it being at once turned to steam. But for the rain there is no doubt a serious conflagration would have resulted, as some of the wooden beams of the engine room were ignited, but were easily extinguished. The electric cables were broken, but this did not affect the running of the mill, as they were connected with a motor in an adjoining building. The damage is estimated at £150.

Late Correspondence.—The following letter has been received since our "Correspondence" pages were closed :—

CARBONS.

Referring to the letter appearing in your issue of August 28th, under the signature of Mr. Alwood, may I be permitted to ask that gentleman two questions?

1. Does he seriously suggest that the loss of £70,000 is entirely due to the apathy of English engineers?

2. Has the Witton Carbon undertaking any past or present connection, agreement, understanding, or agreement, direct or indirect, with any foreign firm or individual?

I am sure if Mr. Alwood will answer these two questions, many of your readers will be relieved.

INQUIRER.

London, *September 9th*, 1914.

[We should have thought that our readers' greatest relief would be to know that when foreign sources of supply are cut off, the most pressing needs can be met from within.—EDS. ELEC. REV.]

Electric Fire Brigade Vehicle Costs in the United States.—Following on the particulars we have recently given with regard to the running and maintenance costs of electric motor vehicles in fire brigade service in Berlin and London, we have been able to procure some recent figures in relation to the electrically-propelled steam fire engine owned by the Fire Brigade of New York.

It may be remembered that we gave some particulars of this machine, which was put in service in April, 1912, in our issue of December 26th last. It may, however, be repeated that the vehicle is one of the Brigade's old horse-drawn steam fire engines which, after having been in service for 10 years, was converted to electric traction by the Couple Gear Freight Wheel Co., of New York, who removed the old front portion of the machine and replaced it with steering gear and a front axle, the road wheels of which are provided with hub electric motors, the necessary current being supplied by an 80-cell storage battery divided into two sections.

For its first year of service, during which there was not a single instance of damage to, or breakdown of, the electrical equipment of the machine, although street accidents necessitated some repairs to the mechanical portion, the vehicle was able to effect an economy of roundly £56 over the annual costs when horses were employed, the costs for the 12 months, including energy, battery maintenance and depreciation, being just under £80. Based on the performance and cost of keeping three horses, the annual charges, including also an allowance for depreciation, for horse haulage, worked out at approximately £136.

The figures now available are for a period of two years, and indicate that the vehicle, with its modern form of propulsion, is still able to show an economy in running and maintenance costs, the total bill for the two years amounting to £274; this included £97 for battery renewals, which were made after the vehicle had been in use for 18 months, £52 for mechanical repairs, tires, &c., and £125 for cost of energy, depreciation and decoration, the machine having taken part in two street parades. The cost of horse traction, as based on the record of the two American Fire Brigades which ordinarily respond to about the same number of calls per annum as the New York electric machine, is given as £293, so that, notwithstanding the outlay for battery renewals, there is still an economy in favour of electric traction. As a rule, better service costs more money; in this case, however, the New York Fire Department not only has a more efficient appliance, but one which is saving money. Not only so, but no account is taken in the quoted figures of the saving in space at the fire station that is effected by the disappearance of the old horse stalls, which is now used for the garaging of one of the officer's motor-cars.

The Disputed Carbons Case.—Sitting as Vacation Judge, Mr. Justice Sankey had before him on Wednesday, September 9th, the action of the Beck Engineering Co, Ltd., and Another *v.* Foster Engineering Co. and Another, the plaintiffs asking for the appointment of a receiver and manager of a large number of carbons for flame arc lamps said to be now in the hands of the police.

Sir Frederick Lowe, K.C., now appeared for the plaintiffs, and the defendants were represented by Mr. Colefax, K.C., and Mr. Clayton.

Sir Frederick Lowe, in opening the motion, dealt at length with the agreements entered into between the parties whom, it would appear, were in one way or another interested in a patent known as the Beck lamp. Mr. Billington, the second plaintiff, had the English rights vested in him, while the foreign patents were in the hands of Mr. Conradty, who resided in Bavaria, and was not a party to the proceedings. In order that these patent lamps could be used, said counsel, certain carbons were required, and those carbons were made by Mr. Conradty, in Germany, and supplied through the Sloan Electrical Co., the second defendants, who acted as his agents. A licence having been granted to the Beck Co. to make the lamps under the patent, the Sloan Co. agreed to keep such stock of these carbons as was necessary, not only for fitting the lamps, but for replenishing them. An agreement for carrying into effect that arrangement was entered into with the Foster Co., but a Receiver of that company having been appointed by the debenture-holders, the agreement with them had come to an end, and the Beck Co. had to look for its carbons to the Sloan Co. as agent of Conradty. The carbons in question being in the possession of the Foster Co. at Wimbledon, the Beck Co. went there and took possession, and in consequence the Foster Co., who so far as counsel could see, had no real interest in the matter at all, preferred a farcical charge of stealing, and the magistrate had committed for trial Mr. Billington, and others, on this extraordinary charge.

His Lordship asked where were the carbons now?

Sir Frederick said that in point of fact they were in the hands of the police. The plaintiffs applied to the Foster Co. to hand over the carbons, but they said they could not do it without the sanction of the Sloan Co.; the Sloan Co. refused unless they could get the consent of Mr. Conradty, and that assent, of course, they could not obtain as they would be dealing with an alien enemy. He submitted that this was merely an attempt by these defendants to get a rise of 30 per cent. in the price for the benefit of this German gentleman.

Mr. Colefax repeated his offer to supply the carbons for cash at the market price of unpatented carbons, and to keep the money in a joint account to be dealt with as the Court might direct at the trial. He submitted that these carbons were admittedly the property of the Sloan Co., and the Court should not, therefore, appoint a Receiver; such appointment would cause great inconvenience.

Sir Frederick said he was prepared to pay the price that existed on August 3rd.

Mr. Colefax said that would not do, as all carbons had risen in price by 50 per cent.

Sir Frederick: Yes, because they are made in Germany. The proper person to decide the price was a Receiver under the direction of the Court, and the appointment of a Receiver was the only satisfactory way of dealing with the matter.

His Lordship said that, if wrong, he had the satisfaction of knowing that he could soon be put right by the Court of Appeal, and his opinion was that at the present time the plaintiff was entitled to have a Receiver. He accordingly appointed a chartered accountant to be Receiver and Manager of the carbons until trial or further order.

Standardisation of Electrical Installations on Motor-Cars.—At the recent meeting of the American Society of Automobile Engineers, the first half of the report presented by the Electrical Equipment Committee was adopted. This covered a recommendation for a standard test of moulded insulation. It was stated that there was no intention of infringing on present practice with respect to certain magneto parts, but that the recommendations had regard solely to certain fittings in other parts of motor-cars, as, for instance, switch-blocks and the like, carrying heavier currents, that, if improperly constituted, would be liable to distortion under excessive currents. It was pointed out that the sole object of the Committee was to lay down a trend that would forestall further and restrictive action on the part of insurance underwriters, besides rendering the operation of the electrically-lighted and started car more satisfactory and safe. The second half of the report, carrying a recommendation in favour of the single-wire system for car electric lighting installations, was lost by a narrow margin, the matter being referred back for further consideration. It is admitted that there are distinct advantages in the two-wire system, but it is claimed that there are equally distinct advantages in the single-wire or earthed return system. The Committee had decided to recommend the single-wire system, believing that the number of motor-car manufacturers using it was bound to increase, and on the score that to hasten such a development would be beneficial rather than harmful. As already mentioned, however, the recommendation was not adopted.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—The Stretford Electricity Committee has appointed MR. A. H. SMITH, of Pendleton, as shift engineer.

MR. E. JORDAN, of Sheffield, has been appointed assistant engineer at the Northampton electricity works, in place of MR. G. G. SMITH, resigned.

MR. H. R. BARNWELL having resigned from the position of works superintendent at Barrow Corporation electricity works, MR. D. B. BEARLEY, assistant, has been appointed to succeed him, at a commencing salary of £170. It is not proposed to appoint an assistant, but to re-arrange the duties of the staff and appoint an additional junior.

Tramway Officials.—MR. R. VINCENT EDWARDS has been appointed to succeed the late Mr. Holliday as engineer and general manager of the Hastings and St. Leonards tramways. Mr. Edwards has been deputy manager for several months; he is a native of Derbyshire, and was articled in 1891 with J. Davis and Sons (a Midland firm of engineers). He had experience in electric lighting and tramway work in Madrid, Corunna and Barcelona. Then for about seven years he was with Messrs. Dick, Kerr & Co.,

Ltd., on contract work in various places, and subsequently had charge of the rolling stock department at their head office in London.

General.—The *British Australasian* states that Mr. A. R. Hanson, son of Mr. M. Hanson, of the firm of Messrs. Lawrence & Hanson, electrical engineers and contractors, of Sydney, has been detained as a prisoner of war in a military prison at Paderborn, in Germany, but communications received from him show that he is well, and is not suffering any ill-treatment.

At Christ Church, Staincliffe (Yorks.), on August 29th, the marriage took place of Mr. Richard Dawson Fairclough, A.M.I.E.E., of Bolton, son of the late Dr. Fairclough, of Mirfield, and Miss Elsie Rowland Sandford, only daughter of the Rev. F. P. Sandford, of Staincliffe.

Mr. Harry Jones asks us to state that having now no business connections with Messrs. Frederick Thomas & Co., his temporary address is 92, Great Portland Street, W. Telephone No. 6020, Gerrard.

Mr. D. Coyle, formerly of Japan, has recently returned to London, and has now permanently settled down at 21, The Drive, Ilford.

Reuter reports that Sir James Sivewright has been arrested at Nuremburg, and is being kept as a prisoner of war.

Mr. F. J. Bell has left the service of the B.T.H. Co., Rugby, having been appointed to a position on the electrical staff of Messrs. Cammell, Laird & Co., Ltd., Sheffield. His departure was marked by a presentation from other members of the staff.

Obituary.—Mr. T. B. Holliday.—Very great respect was shown at the funeral of the late Mr. T. B. Holliday (manager of the Hastings Tramways) on Friday last, at the Hastings Borough Cemetery. Mr. Holliday, who had been in failing health for about a year, was 60 years of age. He was born in Yorkshire, and in early life went to Australia, where he remained for 16 years, and was associated with the cable tramways in Melbourne. Returning to England, he was one of the first to be engaged in tramway construction work in various parts of the country as chief engineer to the late Sir J. Clifton Robinson. Previous to going to Hastings, the late Mr. Holliday was manager of the Brighton Tramways. He had two sons; one is engineer and manager of the Rhondda Valley Tramways, and the other is a member of the Canadian Contingent which volunteered for active service. A large number of tramway employés attended the funeral, also many prominent residents of Hastings, and Mr. G. Kitchin (chairman of the Hastings Tramways Co.). One of the many floral tributes—that from the tramway employés—was in the form of a tramcar with the trolley pole broken.

Mr. H. E. Packham.—The death occurred on August 31st, after a long illness, of Mr. Herbert Edwin Packham, of the firm of Packham & Sons, electrical engineers, of 144, Western Road, Brighton.

NEW COMPANIES REGISTERED.

Boonzaiers, Ltd. (137,558).—This company was registered on September 2nd, with a capital of £10,000 in 5s. shares, to take over from W. G. Boonzaier, of 11, Bramfield Road, New Wandsworth, the benefit of and turn to account certain existing inventions relating to improvements in pump valve structures, to manufacture and deal in pumps, valves, and accessories, galvanometers, ammeters, voltmeters, carbons, cut-outs, switches, motors, batteries, turbines, pipes, wires, lamps, mantels and appliances used in connection with engineering, and to adopt an agreement with the said vendor, S. Hartley and N. W. Bins. The subscribers (with one share each) are:—W. G. Boonzaier, 11, Bramfield Road, New Wandsworth, S.W., engineer; S. Hartley, B.Sc., A.M.I.C.E., Cranford, 35, Arron Road, Catford, S.E., engineer; N. W. Bins, 2, Artillery Mansions, Nightingale Road, Woolwich Common, S.E., traveller. Private company. The number of directors is not to be less than three or more than five; the first are W. G. Boonzaier, S. Hartley and N. W. Bins; qualification, 1,000 shares; remuneration as fixed by the company. Registered office, Tuff's Wharf, Glass Yard, High Street, Woolwich, S.E.

Simplex Self-Starters, Ltd.—This company was registered on September 3rd, with a capital of £10,000 in £1 shares, to carry on the business of manufacturers of, and dealers in, electric or other apparatus designed for starting motor-cars, motor-boats, aeroplanes or other mechanically-propelled vehicles, electricians, &c., and to adopt agreements with B. Lawrence, L. Johnston and J. R. Roberts. The subscribers (with one share each) are:—H. A. Back, 28, Pall Mall, S.W., solicitor; H. Clough, 36, Lime Street, E.C., engineer's agent. Private company. The number of directors is not to be less than three or more than seven; the first are R. R. Revis, M.I.C.E., A. Spurrier, L. Johnston and H. Clough. Solicitors: Surtees, Philpotts & Co., 6, St. Helen's Place, E.C.

Highfield & Co., Ltd. (137,563).—This company was registered on September 2nd, with a capital of £1,500 in £1 shares, to carry on the business of manufacturers of electric appliances of all kinds, marble and slate electric switchboards, mantelpieces, &c. The subscribers (with one share each) are:—E. J. Eades, 51, Harrington Road, Leytonstone, Essex, stationer; G. R. Wadleigh, 68A, Silver Crescent, Gunnersbury, W., clerk. Private company. The number of directors is not to be more than two. G. Highfield is permanent chairman and managing director, with £135 per annum as remuneration; qualification, £100. Solicitor, G. A. Baker, Prudential Buildings, Corporation Street, Birmingham.

Phœnix Electric Heating Co. (1914), Ltd. (137,586).—This company was registered on September 4th, with a capital of £3,000 in £1 shares, to take over the business of a manufacturer of, and dealer in, electrical apparatus carried on by S. D. Cox at 16-17, Morwell Street, Tottenham Court Road, W.C., as the "Phœnix Electric Heating Co." The subscribers (with 751 shares each) are:—S. D. Cox, "Bindon," West Byfleet, Surrey, manufacturing electrical engineer; B. L. Klemens, 2, Tanza Road, N.W., commercial traveller. Private company. The number of directors is not to be less than two or more than five; the first are S. D. Cox and B. L. Klemens (both permanent); qualification, £100. Registered office, 16-17, Morwell Street, W.C.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Aldeburgh Electric Supply Co., Ltd.—Two charges on certain land in Aldeburgh, Suffolk, dated August 7th and August 16th, 1912, to secure all moneys due or to become due from the company to Barclay & Co., Ltd., not exceeding £2,500. (Registered July 11th, 1914, pursuant to order of Court.)

Nu-Lines Manufacturing Co., Ltd.—Debenture dated August 24th, 1914, to secure £400, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: G. Ineson, 82, Evington Road, Leicester.

Whitstable Electric Co., Ltd.—Particulars of £10,000 debs., created August 15th, 1914, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amount being now issued. Property charged. The company's undertaking and property, present and future, including uncalled capital. No trustees.

J. Davis & Co. (Southampton), Ltd.—Particulars of £1,000 debs., created August 27th, 1914, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amount being now issued. Property charged on the company's undertaking and property, present and future, including uncalled capital. No trustees.

Hong-Kong Tramway Co., Ltd.—A memorandum of satisfaction to the extent of £2,200 of trust deed dated July 1st, 1903, securing £195,000, has been filed.

United Electric Car Co., Ltd. (formerly Electric Railway and Tramway Carriage Works, Ltd.).—A memorandum of satisfaction in full on January 1st, 1914, of mortgage dated November 28th, 1901, securing £50,000, has been filed.

CITY NOTES.

United Electric Car Co., Ltd., Preston.

The directors' report on the company's trading for the year ending June 30th, 1914, states that the works have been efficiently maintained as regards buildings and machinery, the cost of which has been charged against revenue. After paying debenture interest amounting to £642, and charging £6,184 for depreciation (including £4,500 added to reserve), the profit for the year is £16,096, to which is added £1,559 brought from last year, making a total of £17,654; deduct preference dividend for the six months ending December 31st, 1913, £3,000, leaving an available balance of £14,654. The preference dividend, less income-tax for the half-year ending June 30th, 1914, absorbs £3,000, a dividend of 5 per cent. less income-tax on the ordinary shares for the year ending June 30th, 1914, £7.500; there is placed to general reserve £2,000, and £2,154 is to be carried forward. The balance of the debenture stock was redeemed on January 1st, 1914. Mr. George Richardson and Mr. John Kerr have retired from the board during the year, and Mr. John Greenwood has been elected a director.

South London Electric Supply Corporation, Ltd.—The directors having declared the dividend on the 6 per cent. cumulative preference shares for the half-year to October 1st next, payment of the same will be duly made on that day.

Dumbarton Burgh and County Tramways Co., Ltd.—A dividend of 1½ per cent. on the ordinary shares for the year is recommended, carrying forward £4,265.

Davis & Timmins, Ltd.—The directors announce an interim dividend at the rate of 6 per cent. per annum, less income-tax, on the ordinary shares for the half-year, payable September 15th.

British Electric Transformer Co., Ltd.—The directors have paid an interim dividend at the rate of 6 per cent. per annum, less income-tax, on the ordinary shares for the half-year.

Electric Supply Co., of Victoria, Ltd.—A dividend at the rate of 6 per cent. per annum on the preference shares for the period to March 31st, 1913, is recommended, allocating £1,000 for depreciation of stores, £2,175 written off discount and commission on debenture stock account, and carrying £3,626 forward.

Clyde Valley Electrical Power Co.—The directors report for the half-year ended June 30th last a profit of £30,665, plus £9,477 brought forward. After payment of the dividends on preference shares to April 30th, 1914, amounting to £8,724, and after adjusting interest and transferring £12,500 to contingency fund for depreciation, &c., there remains a balance of net profit of £19,297. £1,925 is to be transferred to special reserve fund, and £17,372 carried forward.

Fairbairn, Lawson, Combe Barbour, Ltd.—The directors announce (says the *Financial Times*) that in view of the present unsettled conditions created by the war, they have decided not to declare an interim dividend on the ordinary shares.

Alabama Traction, Light and Power Co.—The *Financial News* states that owing to the war, &c., the directors have decided to defer the payment of interest on the first mortgage bonds due September 1st.

Oxford Electric Co., Ltd.—An interim dividend at the rate of 5 per cent. per annum, less income-tax, on the ordinary shares for the half-year is announced, payable September 15th.

Manila Electric Railroad and Lighting Corporation.—The directors have declared a quarterly dividend of 1¾ per cent. for the quarter ended September 30th on the common stock.

Puebla Tramway, Light and Power Co.—The directors' report states (says the *Financier*) that the net profits in Mexico for the year 1913 amounted to $736,953 (Mexican), as compared with $753,636 for 1912. Reckoning the earnings at the parity of exchange, there is a balance, after meeting all expenses, bond interest and first mortgage bond sinking fund, of £1,105, but owing to the heavy loss in exchange, which amounted to £19,456, the net result is a debit balance of £18,350, which amount has been carried to the balance-sheet. The directors are pleased to report that, except for some slight damage done from time to time by bandits, the company's various properties have suffered no material damage, and, in view of the disturbed condition of Mexico, the result of the year's working is a matter for congratulation. Until conditions improve, and during such time as the rate of exchange remains at the present low figure, the earnings of the company must continue to be adversely affected.

Aberdeen Suburban Tramways, Ltd.—At the half-yearly ordinary meeting of the shareholders Mr. James Mearns, chairman of directors, stated that the company continued to make satisfactory progress, and they were now finding some advantage in the reduction in the price of the electric power which they got from the Town Council. The renewal and the depreciation fund now amounted to the substantial sum of £14,000, being nearly one-half of the paid-up capital of the company. The chairman moved that a dividend at the rate of 2½ per cent. per annum be declared, and this was agreed to.

Nairobi Electric Power and Lighting Co., Ltd.—The directors report a satisfactory result of the working for the half-year ending June 30th, 1914, showing an improvement upon the previous year's result quite up to their anticipations. They announce an interim dividend at the rate of 6 per cent. per annum on both the preference and the ordinary shares in respect of that period.

Monterey Railway & Power Co.—The report for 1913 shows total net revenue of $144,251, a decrease of $74,177. After meeting fixed charges, interest on debenture stock, and providing for the 5 per cent. dividend on the preferred, a balance of $127,251 was shown, which increased the surplus carried forward to $601,098. From this, $150,000 was placed to reserve for contingencies, increasing that fund to $450,000. This left a balance to profit and loss account of $451,098.—*Financial News.*

Calcutta Electric Supply Corporation, Ltd.—The number of units delivered to consumers during the five weeks ended July 31st, 1914, amounted to 1,713,183, compared with 1,443,028 units in the corresponding five weeks of 1913.

STOCKS AND SHARES.

Tuesday Evening.

WEIGHT of opinion gathers cumulative force in pressing the Stock Exchange Committee to reopen the House with the least possible delay. This pressure is applied from various directions. It is pointed out that inconvenience, hardship and suffering are inflicted upon many people what time the markets remain closed; and suspension of all Stock Exchange rules—should that be necessary—is advocated as justifiable in the unique circumstances at present ruling. We tabulated last month the principal causes militating against such an opening of the Stock Exchange as would inevitably bring panic, and make matters much worse than they are at present; and the Stock Exchange Committee continue to maintain the attitude that, until definitely good news comes from the seat of war, it is impossible, from the point of view of public financial safety, to consider the question of putting the machinery into motion once more.

Holders of all high-grade securities—such, for instance, as those comprised in the preordinary issues of electricity supply and telegraph companies—have a keen interest in the discussions that is raging round the price of Consols. Since the Stock Exchange closed, the dealers in the Consol market have purposely retained the price of the Funds at a high level, at which they were prepared to sell, rather than reduce it in response to ordinary market conditions where supply exceeds demand.

The view is that, if Consols are allowed to fall away, a blow is struck at national credit and at the values of all first-class securities, which might have a serious effect upon the public mind. A ring was accordingly formed of jobbers who declined to sell below certain figures. Other people, however, were not bound by this, and they have been dealing on a basis substantially lower. It is maintained that this latter practice offers an opportunity for hostile finance to strike at British credit, and a strong effort has been made to bring into line all the prices of stocks in that class where Consols stand as leader. What will be the upshot of the petition it is difficult to say. To tamper with a free market is at all times a dangerous policy, but a good many theories have to go by the board in these days of a war unique in the history of the world.

Various inquiries reach stockbrokers daily as to what bargains are to be picked up. The action of the Consol market, outlined above, has been so generally followed that there has been no scaling down of values anywhere. Sellers find it difficult to get anything like the quotations current at the end of July, but, on the other hand, buyers discover that nothing is being offered at a knock-out price. And the reason for this is obvious—sellers certainly do not wish to spoil their own markets by forcing prices down at a time when everything is nominal, but they are quite open to bids, and it is for the buyers to name what prices they are prepared to give.

The buyer, however, finds himself in the position of hardly knowing what to offer for shares which he might be tempted to secure at a low figure. To assist him at this point, we have prepared a short set of tables showing the yields per cent. obtainable from leading electrical securities at varying prices. For example: City of London Ordinary shares, when the Stock Exchange closed at the end of July, gave a return of 6¼ per cent. on the basis of the last 10 per cent. dividend. The shares then stood at 16. Assuming the distribution to be maintained, at 15, the shares would pay 6⅔ per cent.; at 14, 7⅛ per cent.; and at 13, nearly 7¾ per cent. Such calculations serve to give an idea of levels at which prices may be regarded as attractive, and the annexed tables follow the same line of demonstration as that cited in the case of City of London Ordinary:—

Ordinary share.	Dividend.	Price.	Yield.
Brompton	10	July 30th, at 9¾	£5 6 9
		,, ,, 9	5 11 1
		,, ,, 8	6 5 0
		,, ,, 7	7 2 10
Charing Cross Ordinary	6	,, ,, 5⅝	5 9 8
		,, ,, 5	6 0 0
		,, ,, 4½	6 13 5
		,, ,, 4	7 10 0
County Ordinary.. ..	7	,, ,, 12½	5 14 3
		,, ,, 11½	6 1 9
		,, ,, 11	6 7 2
		,, ,, 10½	6 13 4
Kensington	9	,, ,, 7⅞	5 16 3
		,, ,, 7	6 8 7
		,, ,, 6½	6 18 6
		,, ,, 6	7 10 0
St. James's	12	,, ,, 9⅝	6 1 6
		,, ,, 9	6 13 4
		,, ,, 8	7 10 0
		,, ,, 7½	8 0 0
Westminster	10	,, ,, 8⅝	5 12 9
		,, ,, 8	6 5 0
		,, ,, 7	7 2 10
		,, ,, 6	8 6 8

Other calculations can be worked out from these tables, and no difficulty will be found in arriving at yields from prices between those given above. Examples from the Telegraph and Manufacturing sections must be reserved for another week.

Rumours are current in the City as to a possible *rapprochement* between one of the big London companies and a smaller one, operating in a contiguous area. Possibly, of course, the negotiations may have started before the war did, and recent transactions may have been simply to wind up the preliminaries. It looks, however, as though interesting developments might be expected before long.

Not much business has been transacted amongst electrical issues. A fair number of the stocks which were wanted, and which we catalogued here two or three weeks ago, have come to market, but there are still buyers for certain others. We hear of British Westinghouse Preference changing hands this week on the basis of 34s., and of the Prior Lien bonds being done at 102; while a number of electricity supply Debenture stocks can also be placed on quite good terms. The Rubber share market is quiet; and of the armament issues the only traceable activity has been in Vickers, which stand now at 30s.-31s., *ex* a shilling dividend.

ELECTRIC TRAMWAY AND RAILWAY TRAFFIC RETURNS.

Locality.	Month ended (4 wks.)	Receipts for the month.		No. of weeks.	Total to date.		Route miles open.	Inc.
		£	£		£	£		
Bath	..	..	..	..	..	..	..	..
Blackpool-Fleetw'd	Sept. 5	6,333	—2,915	35	30,596	— 3,108	8	..
Bristol	,, 4	35,684	— 389	36	307,522	+20,269	30·5	..
Brit. Elec. Trac. Co.	Aug. 28	241,629	+8,200	..	..	..	429·9	..
Chatham and Dist.	Sept. 3	4,146	— 69	35	33,084	+ 565	14·98	..
Cork	,, 3	2,118	— 94	35	17,820	+ 126	9·89	..
Dublin	,, 4	24,647	+3,233	36	209,103	— 1,274	54·25	..
Hastings	,, 2	5,110	—1,931	..	..	— 1,452	19·3	..
Lancashire United	,, 2	6,743	— 50	35	58,968	+ 4,894	42	*
Llandudno-Col. Bay	,, 4	1,695	—1,456	40	12,798	— 1,667	6·5	..
London United ..	,, 4	25,874	—1,470	36	224,990	— 912	..	..
Tyneside	,, 2	2,659	+ 396	10	5,834	+ 463	11	..
Anglo-Argentine ..	Aug. 26	200,658	—13,096	34	1,869,506	—15,006	..	..
Auckland	..	..	..	..	..	..	25·42	1·03
Brisbane	August	33,172	+3,902	34	231,827	+24,649	..	..
Calcutta	Sept. 5	17,975	+ 318	..	..	+ 7,843	20·5	..
*Madras	Aug. 15	1,889	+ 86	32	29,074	+ 2,266	15·25	..
Montevideo ..	August	26,075	—2,754	41	303,758	— 6,693	..	..
Cen. London Rly.	..	..	..	..	..	..	..	..
City & S. Lon. Rly.	..	..	..	..	..	..	..	..
Dublin-Lucan Rly.	Sept. 4	625	— 93	9½	1,628	— 163	7	..
L'pool Overh'd Rly.	..	..	..	..	..	..	..	..
London Elec. Ry. Co.	..	..	..	..	..	..	..	..
Mersey Railway ..	..	..	..	..	..	..	..	..
Metropolitan Rly.	..	..	..	..	..	..	..	..
Met. District Rly.	..	..	..	..	..	..	..	..

* Two weeks.

AMERICAN EXPORTS OF ELECTRICAL GOODS.

The following figures, showing the exports of electrical goods from the United States during the year ended June, 1913, are taken from the recently-issued trade statistics; where possible, figures for 1911-12 have been added for purposes of comparison, and notes of any increases or decreases given :—

	1911-12. Dollars.	1912-13. Dollars.	Inc. or dec. Dollars.
Telegraph instruments.—			
To Canada	17,000	37,000	+ 20,000
,, Central America	9,000	6,000	− 3,000
,, Mexico	13,000	15,000	+ 2,000
,, Columbia	—	33,000	+ 33,000
,, Argentina	11,000	—	− 11,000
,, Cuba	4,000	66,000	+ 62,000
,, Other countries	14,000	58,000	+ 44,000
Total	68,000	215,000	+ 147,000
Telephone instruments.—			
To United Kingdom	56,000	151,000	+ 95,000
,, Canada	582,000	779,000	+ 197,000
,, Central America	17,000	7,000	− 10,000
,, Mexico	24,000	42,000	+ 18,000
,, Cuba	107,000	79,000	− 28,000
,, Brazil	59,000	107,000	+ 48,000
,, other S. America	20,000	37,000	+ 17,000
,, Japan	21,000	30,000	+ 9,000
,, Australia	53,000	5,000	− 48,000
,, Other countries	35,000	135,000	+ 100,000
Total	974,000	1,372,000	+ 398,000
*Other electrical instruments and appliances.**—			
To Canada	3,102,000	5,968,000	—
,, Mexico	926,000	1,153,000	—
,, Central America	286,000	1,145,000†	—
,, Cuba	504,000	610,000	—
,, Argentina	414,000	362,000	—
,, Brazil	2,236,000	2,375,000	—
,, Japan	08,000	1,067,000	—
,, Philippine Islands	319,000	344,000	—
,, Australia	134,000	672,000	—
,, United Kingdom	828,000	781,000	—
,, Other countries	1,235,000	2,970,000	—
Total	10,682,000	17,447,000	—
Electrical machinery.—			
To Canada	1,870,000		—
,, United Kingdom	833,000		—
,, Mexico	950,000		—
,, Central America	136,000	Shown	—
,, Cuba	316,000	under	—
,, Argentina	153,000	separate	—
,, Brazil	906,000	headings	—
,, British India	147,000	in	—
,, Japan	911,000	1912-13,	—
,, Australia	534,000	see	—
,, Philippine Islands	117,000	below.	—
,, South Africa	134,000		—
,, Other countries	1,238,000		—
Total	8,415,000		—
Gas engines, stationary.—			
To Canada	131,000	150,000	+ 19,000
,, Argentina	74,000	23,000	− 51,000
,, Australia	38,000	28,000	− 10,000
,, Europe	57,000	104,000	+ 47,000
,, Other countries	94,000	107,000	+ 13,000
Total	394,000	412,000	+ 18,000
Electric meters.—			
To United Kingdom		150,000	—
,, Canada		1,033,000	—
,, Panama		233,000	—
,, Mexico		441,000	—
,, Cuba	Included	148,000	—
,, Argentina	in	82,000	—
,, Brazil	electrical	272,000	—
,, Chile	machinery.	104,000	—
,, British India		105,000	—
,, Japan		399,000	—
,, Australia		264,000	—
,, Other countries		567,000	—
Total		3,798,000	—
Petrol engines, stationary.—			
To Canada	755,000	1,269,000	+ 514,000
,, Argentina	397,000	334,000	− 63,000
,, Australia	307,000	341,000	+ 34,000
,, Mexico	43,000	40,000	− 3,000
,, United Kingdom	98,000	100,000	+ 2,000
,, Other countries	863,000	793,000	− 70,000
Total	2,463,000	2,877,000	+ 414,000
Steam engines, stationary.—			
To Canada	248,000	260,000	+ 12,000
,, Cuba	90,000	100,000	+ 10,000
,, Mexico	61,000	51,000	− 10,000
,, Brazil	42,000	78,000	+ 36,000
,, Philippine Islands	22,000	20,000	− 2,000
,, Other countries	288,000	199,000	− 89,000
Total	751,000	708,000	− 43,000
Electric locomotives.—			
To Canada	46,000	146,000	+ 100,000
,, Panama	—	25,000	+ 25,000
,, Cuba	—	43,000	+ 43,000
,, Haiti	—	21,000	+ 21,000
,, Chile	18,000	17,000	− 1,000
,, Other countries	24,000	22,000	− 2,000
Total	88,000	274,000	+ 186,000
Dynamos and generators.—			
To Canada		585,000	—
,, United Kingdom		342,000	—
,, Panama		121,000	—
,, Mexico		166,000	—
,, Cuba	Included	122,000	—
,, Brazil	in	114,000	—
,, Peru	electrical	109,000	—
,, Japan	machinery.	848,000	—
,, Australia		117,000	—
,, Other countries		249,000	—
Total		2,773,000	—
Fans.—			
To Canada		133,000	—
,, Argentina		53,000	—
,, Brazil	Included	20,000	—
,, China	in	25,000	—
,, British India	electrical	37,000	—
,, Japan	appliances.	10,000	—
,, Other countries		81,000	—
Total		359,000	—
Arc Lamps.—			
To Canada	Included	91,000	—
,, Brazil	in	52,000	—
,, Other countries	electrical	43,000	—
Total	appliances.	186,000	—
Carbon filament lamps.—			
To Canada	Included	13,000	—
,, Mexico	in	113,000	—
,, Brazil	electrical	28,000	—
,, Other countries	appliances.	74,000	—
Total		228,000	—
Metal filament lamps.—			
To Canada		56,000	—
,, Mexico		55,000	—
,, Cuba	Included	38,000	—
,, Argentina	in	42,000	—
,, Brazil	electrical	53,000	—
,, Australia	appliances.	34,000	—
,, Other countries		117,000	—
Total		395,000	—

* Owing to changes in classification (see below), the figures under this heading for the two years are not on a comparable basis.

† Panama, 1,012,000 dollars.

Import Duty on Catalogues for South Africa.—

The following alteration has been made in the South African Imports Tariff :—

Catalogues or price lists of foreign firms addressed to importers, merchants, or manufacturers—

Previous duty.	*Alteration.*
25 % *ad valorem*, or 2d. per lb., whichever is the higher; with a rebate to British goods of 3 %.	Duty free.

We learn that this alteration in the law of the Union of South Africa was initiated by the British Electrical and Allied Manufacturers' Association, and effected through the instrumentality of Sir R. Sothern Holland, H.M. Trade Commissioner, Cape Town.

LARGE ELECTRICAL SMELTING FURNACES.

[BY OUR CORRESPONDENT IN NORWAY.]

At a recent meeting of the Polytechnical Association at Christiania, Mr. A. Helfenstein, who is a well-known expert on large electrical furnaces, and who has now one furnace of 10,000-12,000 H.P. of his own type at work in Sweden for the production of electric pig-iron, read a paper on the above subject, of which the following is an abstract.

In comparison with other furnaces the electrical furnace has four special features which are characteristic of all the smelting processes that can be carried out with it, and also of the construction of the furnace itself :—

1. The total absence of all kinds of fuel from the furnace. This has the great advantage to the smelting process that it allows a much better concentration of the materials under treatment to be achieved, and further, that all the impurities which otherwise are conveyed to the bath through the fuel, and, consequently, are absorbed by the metal and appear in the finished product, are avoided. The electrical furnace has, in other words, the advantage, in comparison with other furnaces, that the same quantity of raw material can be dealt with in much smaller smelting chambers than those required in ordinary blast furnaces, and that a product of considerably greater purity can be obtained, because there are no other impurities to be dealt with than those which the raw material itself contains.

2. The second peculiarity in connection with electrical heating is the higher temperature that is attained. This is the essential quality which has made possible the manufacture of certain products which previously could not be produced at all, or, if it were possible, only with the greatest difficulty by means of the old methods of heating. Reactions, for which a high temperature is required, have been rendered practicable by the aid of electrical heating, and there are now employed in the industry several processes for which a temperature of more than 3,000° C. is necessary.

3. The third peculiarity of electrical heating is the heating from the interior outwards. The heating of the raw material by means of ordinary fuel is usually effected from the exterior and inwards, and the two heating processes are thus based on two different principles, quite opposite to each other. In the case of electrical heating, the core or the centre of the charge is first heated to a high temperature, and the hot zone is then gradually extended in an outward direction towards the wall of the furnace, which thus very seldom is exposed to such a high temperature as that ruling in the centre. It is just this peculiarity which explains the possibility of employing processes that require very high temperatures with the aid of apparatus of a comparatively simple and plain construction.

4. As the fourth advantage of electrical heating as compared with ordinary heating may be mentioned the ease of regulation of the heat.

By regulating the current and voltage and the current density in the electrodes, the temperature can be varied as may be desired, and this is of fundamental importance for the carrying out of thermal processes, especially in cases where the object is to produce special products of high quality. It is beyond all doubt that it is possible by means of electrical heating to obtain higher limits for the reaction temperature than in cases where ordinary fuel is employed. The charge can be heated to a temperature of 200°-300° above the temperature which is absolutely necessary for the reaction, by means of which it becomes possible to obtain certain effects which are not without importance to the refining of the products on the whole. Such beneficial effects are excluded if ordinary fuel is employed, because the whole charge is heated to and kept at the lower reaction temperature.

After having mentioned the advantages of electrical heating, it is only just to point out certain drawbacks as well, which first of all are due to the electrodes which conduct the energy to and from the furnace. (Electrical heating by induction is not dealt with in the present case, because it is of minor importance, at all events at the present moment, it being only employed on a small scale by certain manufacturers.)

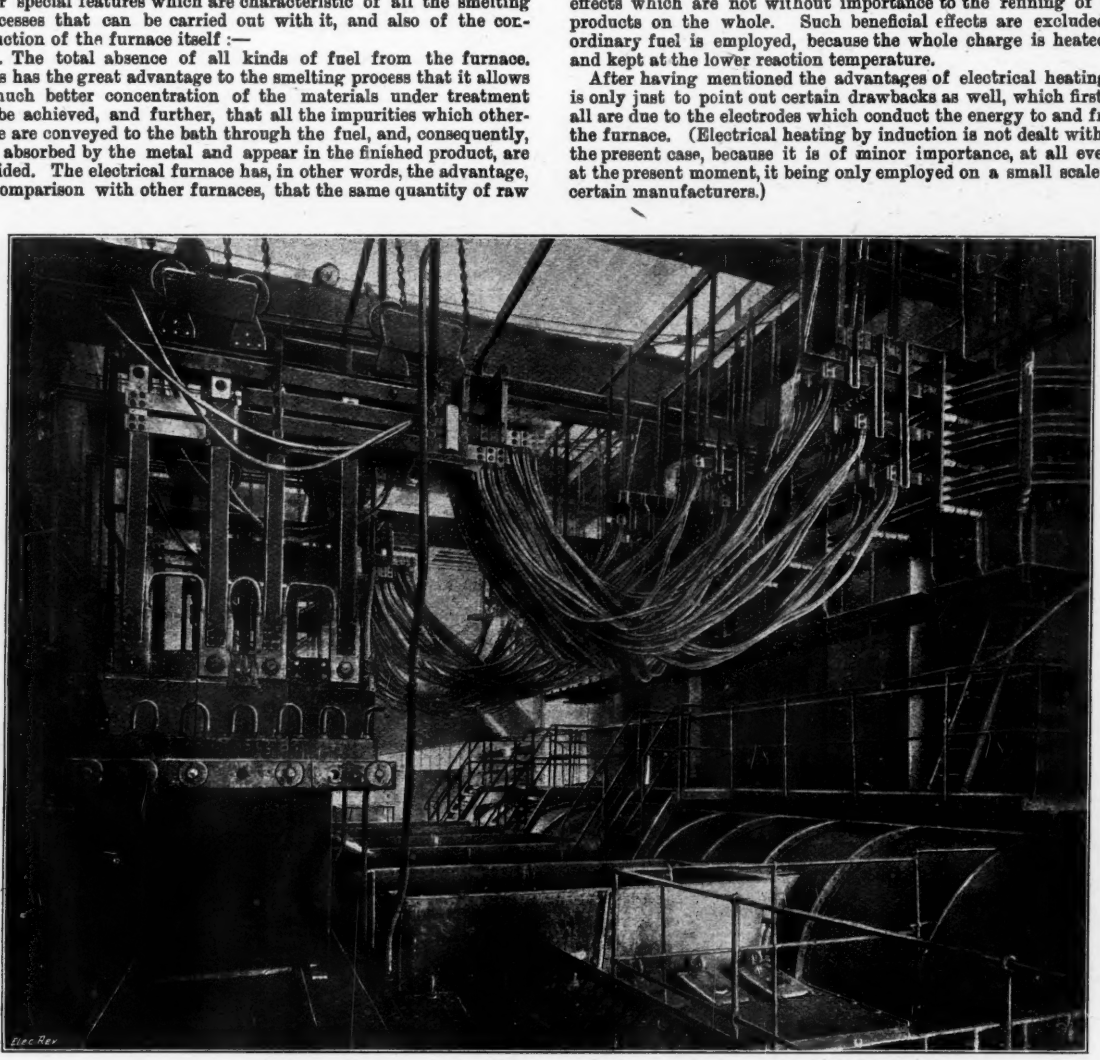


FIG. 1.—TRANSFORMERS AND ELECTRODES OF HELFENSTEIN FURNACES; ELECTRODES WITHDRAWN.

It is well known that as far as small electrical furnaces are concerned, the energy can be conducted to the furnace through electrodes, which enter the furnace-chamber itself in a horizontal, vertical, or oblique direction from above. Electrodes can also be placed at the floor of the chamber.

Years of experience have proved, however, that the vertical position of the electrodes is the only one suitable for large furnaces from a technical and practical point of view, and, further, that an electrode at the bottom should be avoided. A uniform and exact regulation of the current is much more necessary in large than in small furnaces, and the electrodes must always have the necessary voltage and ampere load, as it otherwise would be quite impossible to take advantage of and utilise the full amount of power at disposal. And it stands to reason that a loss of 10-15 per cent. of the energy is of greater importance in cases where large quantities of energy are dealt with than in the case of only small amounts. The practice of employing fixed electrodes for large powers is anything but profitable, and it is therefore advisable to use movable electrodes placed in a central position above the bath. Bottom electrodes have also their drawbacks, because a conductor placed in this position would weaken the construction of the furnace itself, causing difficulties and making continuous work impossible. In furnaces to which the energy is conveyed through the bottom, it is also necessary that the floor should be a good conductor, and it might thus be made from carbon electrodes; but

such a floor would be very unpractical for certain products, as, for instance, iron, because the whole floor would gradually be corroded. In large furnaces, *i.e.*, for large quantities of energy, there is thus no other way of conducting the energy to and from the furnace than by means of vertical electrodes, which are suspended, and are easy to regulate. This arrangement has also the great advantage that the size of the electrode bundles can be increased at any time as it may be required, so that it may become possible to raise the efficiency of the furnace. The employment of an electrode at the bottom forms a striking contrast to the above-mentioned system, because the difficulties increase in proportion to the load, and this would completely frustrate the development of really large plants.

To conduct even 20,000 amperes through the floor of a furnace involves great technical difficulties, and, as far as is known, no one has ever attempted to go beyond that figure. In addition to this, it has also to be considered that by the employment of bottom electrodes the floor of the furnace is heated, producing an injurious effect on this very important part of the furnace. By employing vertical electrodes all these drawbacks are avoided, and the possibilities of operating with large quantities of power are almost unlimited. There are now furnaces that have been in operation for the last seven years, and working with 40,000 amperes per bundle of electrodes without any difficulties, and it is only a question of time for a higher load to be employed. Large electrical furnaces will thus generally have the appearance of a square or circular short shaft, in which the electrodes conducting the energy to and from the furnace hang freely, and here it is now necessary to mention something about the form and construction of such furnaces.

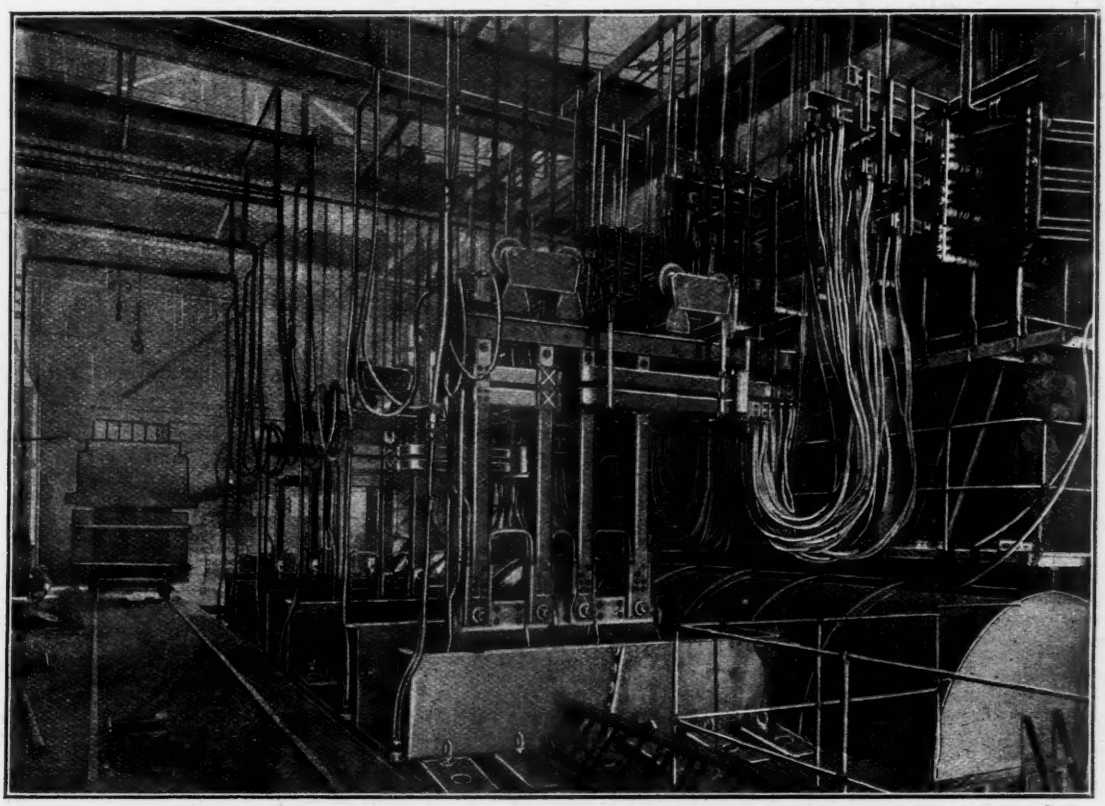


Fig. 2.—Row of Helfenstein Furnaces, Top View; Electrodes in Position.

For furnaces in which ordinary fuel is employed, the most common shape of the furnace has been the circular form, for the reason that this construction was the most suitable one for an easy arrangement of the supports. In the commencement the same pattern was also adopted for electrical furnaces, but as the furnaces increased in size it soon became necessary to adopt a form which was in accordance with that of the electrodes. For large quantities of power only electrodes in bundles can be employed, and as these, for various reasons, have to be manufactured with a rectangular cross-section, it also became necessary to give the shaft of the furnace a rectangular or oval form. This is the chief reason why all the large and open electrical furnaces are now constructed in the form of a square shaft with the electrode bundles, of which there are two or more, hanging in a vertical position, and parallel with each other. The number of the electrode bundles depends chiefly on the current employed, and two, or several, double bundles are thus used for continuous or single-phase alternating current, whilst three, or several bundles made up from three, electrodes are used for three-phase current. It is, however, almost out of the question to employ continuous current for the manufacture on a large scale, because the plant would become too expensive, and in addition to this, the working expenses would also be too high on account of the wear of the brushes and the commutators. There are also certain difficulties connected with the transmission of continuous current, for which reason only single-phase or three-phase current is employed in the electro-metallurgical industry on a large scale. But here comes in, especially in large electrical furnaces, the effect of phase displacement, increasing the capital expenditure, because the generators have to be constructed with larger dimensions in order to be able to supply a certain amount of power. A power factor of 0·8 may pass, and it is possible to limit it to this figure in large three-phase furnaces with a capacity of up to 12,000 H.P., when certain precautions are taken with regard to the frequency and to the supply of the secondary current. It is even possible that the same result may be achieved with larger amounts of energy without any corresponding increase of the phase displacement, but this depends first of all on the construction of the plant. When the furnaces are closed, it will become possible to place the transformers so near them that the secondary conductors become very short. And here we arrive at the main problem in connection with large electrical furnaces, viz., the closing of the furnaces, and, in consequence thereof, the utilisation of the gas. Free combustion of the gas above the open furnace represents a great drawback, which grows in proportion to the increase of the load. The intense heat has, first of all, an injurious effect on the conductors and on the electrode holders. The conductance of the conductors is considerably reduced, and their durability as well, for which reason either the dimensions must be enlarged or cooling arrangements must be provided. Secondly, the workmen are exposed to the heat and smoke from the large open furnaces to such a degree that their working capacity is reduced, for which reason the number of men must be increased. There are thus sufficient reasons for employing closed furnaces and providing for the removal of the furnace gases. These have, moreover, a high thermal value, which should not be overlooked, especially in cases where the object is to produce metals, and iron in particular, because the electric furnaces have to compete with the ordinary type, in the working of which the utilisation of the gas plays an important part.

The lecturer has worked upon the problem of closing large furnaces since 1906, when he succeeded in getting into operation furnaces with a capacity of up to 12,000 H.P. for the production of carbide and ferro-alloys. The solution of the problem depends on the three following factors:—

1. A durable cover or roof.
2. The utilisation of the gas.
3. The charging to be made continuous.

The first question was solved by building water-cooled partitions between the electrodes, which served both as supports for the arch and as charging funnels. In these funnels the electrodes hang freely, and are movable and surrounded by the charging material. Underneath the roof the partitions form chambers, in which it is easy to collect the furnace gases. These chambers are connected with a common gas-pipe for the removal of the gases, which run

alongside of the furnace. The space around the electrode is closed by the charge itself, and the work is conducted in such a way that the furnace is always kept under a slight pressure of gas, *i.e.*, small gas flames are formed around the electrodes above the roof, which prove that no air is being admitted to the furnace. Years of experience have shown that this principle answers the purpose for carbide and ferro-alloy furnaces with a capacity from 6,000 to 12,000 H.P.

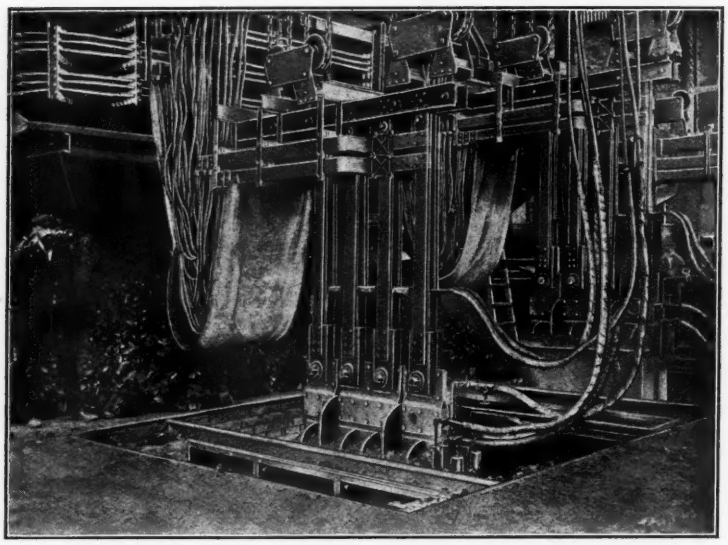


Fig. 3.—Suspension of Carbon Electrodes, and Flexible Connections for Electricity and Cooling Water.

It is obvious that the capital cost of buildings and plant is considerably less for large than for smaller plant in proportion to their capacity. Large furnaces require much less space than an equivalent number of small furnaces, and if a comparison be made between carbide furnaces of 1,000-1,500 H.P. and large closed furnaces, the capital expenditure for the former, including buildings and electrical plant and outfit, will amount to about £4 9s. per H.P., while the cost of the latter will scarcely exceed £2 10s. or £2 16s. per H.P.

As regards labour, a 10,000-H.P. furnace will require no more than seven men per shift, while 10 single-phase furnaces of 1,000 H.P. will require double the number.

The consumption of working materials in large furnaces will scarcely be more than one-half or one-third of the corresponding consumption for small furnaces, and in addition the conductors are protected against heat and smoke, for which reason they are more durable, while the loss of energy in the secondary conductors is also far less.

As regard the efficiency, this is not much higher in large furnaces than in smaller ones of 1,000 H.P., for instance, if the loss of energy, arising from the employment of bottom electrodes, be not taken into account. The utilisation of the current in small furnaces has been brought to such a stage that it would be difficult to improve upon it. As regards the consumption of electrodes, this is higher in large than in small furnaces, on account of the higher voltage employed, but this is compensated for by the electrodes being protected against the air by the charge.

It is also an advantage with large furnaces that the working on the whole is facilitated, and that it is easier to supervise the whole plant. By means of certain arrangements in connection with the transformers, it has also become possible to operate with large variations of the supply of power. Furnaces that are constructed with a rating of 10,000 H.P. can thus be kept running for months with only 4,000 H.P., without any harm being done either to the furnace itself, or to the working, on the whole, from a technical point of view, and this is one of the most important advances recorded in the technics of large furnaces, that a furnace constructed for a certain medium load can be worked with a much higher load, as well as with a much lower load, without injury. The furnaces are now constructed in such a way that they can be kept running for years without any repairs worth mentioning being required.

As regards the removal of the furnace gas by means of suction, this can only be done profitably in large furnaces, because the supply of gas in small furnaces is so small and irregular that it would be very difficult to remove gas of a sufficiently good quality constantly and regularly.

On the basis of the experience gained from the construction and working of large furnaces for the manufacture of carbide and ferro-alloys, the lecturer and his engineers turned their attention to the problem of producing electrically pig-iron directly from iron ore, which has resulted in the construction of the large electrical furnace at the Domnarfvet Iron Works in Sweden.

The fundamental principle of this furnace is the same as that of the other carbide and ferro-alloy furnaces, and, therefore, there has not been employed any shaft for the material, as it was of great importance to make the construction of this furnace, which is the first one of its kind, and may thus be regarded as an experimental furnace, in which the gas is removed close to the place in which it is produced, as plain and simple as possible. The question about the shaft is, however, left open, to be decided at a future date.

The furnace was started in May, 1913, and worked well from the commencement. It was constructed for a load of 10,000 to 12,000 H.P., and the dimensions of the conductors are in accordance therewith. However, it was soon found that it was quite impossible to employ the above-mentioned power, because the generators at the Domnarfvet power station were working at a frequency of 62 cycles per second, resulting in so low a power factor that it was not practicable to run up to 10,000 H.P. The furnace was then worked with 6,000 to 8,000 H.P.—*i.e.*, 120 volts between the phases and 26,000 amperes per bundle of electrodes—and with this load it became possible to limit the phase displacement to $\cos \phi = 0{\cdot}8$. The maximum output of the furnace was 65 tons of pig-iron per day of 24 hours,

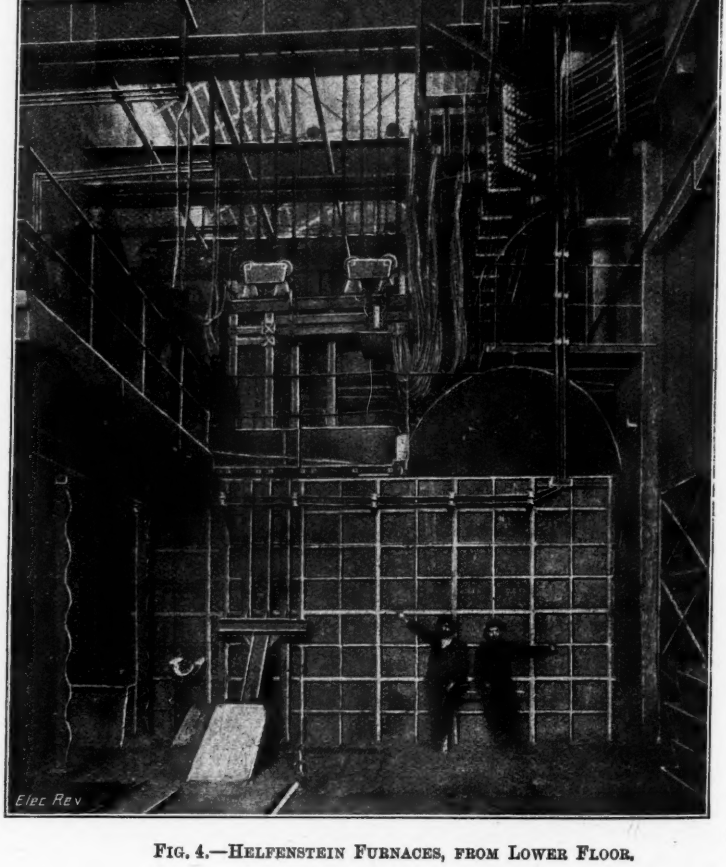


Fig. 4.—Helfenstein Furnaces, from Lower Floor.

and the average production per month varied between 1,200 and 1,600 tons. The consumption of energy, fuel and electrodes, per ton of pig-iron, was, on the average, as follows, the ore containing

60 per cent. iron :—Energy 2,000 KW.-hours ; charcoal, 330-400 kg. ; electrodes, 7 kg.

The calorific value of the furnace gases amounted to 2,800-3,000 calories per cb. m.

A comparison with the Electro-metal furnace is somewhat unfavourable to this furnace in regard to the consumption of energy and fuel, while both furnaces are about equal in respect of the consumption of electrodes, as this can certainly be reduced to an average of 5 kg. per ton of pig-iron. On the other hand, the present furnace has the following advantages :—

1. The capital expenditure is considerably lower, viz., about £2 15s. per H.P. for the whole plant, while the Electro-metal plant involves an expenditure of £4 9s. for a corresponding plant.

2. A richer gas is produced in this furnace, having a heating value of 2,800-3,000 calories, as compared with only 2,300 calories from the Electro-metal furnace.

3. The whole plant is easier to work and can be better controlled and supervised. This large furnace can be started much more easily and quickly than the large shaft furnaces of the Electro-metal type, and it has thus been possible, even after a stoppage of two or three days, to start the furnace and have the full load on in the course of 10 to 15 minutes, after which the tappings can be made in the normal course after a few hours.

It is of special importance that additional materials can be added to the charge directly at the melting place, because the effect will then be an immediate one. In furnaces with high shafts it may sometimes take hours before the additions are able to reach the smelting zone. The working of the low smelting furnaces is also considerably safer than that of the shaft furnaces, as there is no danger of explosions taking place.

4. Pulverised ore can be employed without any risk of obstructing the smelting process, and it need scarcely be pointed out that this is one of the greatest and most important advantages of the whole system. At Domnarfvet charges were employed with up to 70 per cent. of "slig" (not briquetted) without the working being obstructed in any way. As an experiment, 30 per cent. of dust from the throat of the furnace was added to the charge without any injurious effect on the smelting process being observed. This circumstance that the furnace can be worked with such large quantities of slig is of the utmost importance under the conditions obtaining in Norway.

5. Minimum of labour. The number of men required for a 10,000 H.P. furnace is as follows :—Three chargers, one regulator, and three men for the tapping, or seven men per shift in all. Out of the total number of 21 men, three men for the charging may possibly be dispensed with, if a charging-crane be employed.

6. In the utilisation of coke for the reduction, we have arrived at the real crux of the question of electrical pig-iron. The conditions for the employment of coke as a substitute for charcoal are the following :—

(*a*) A lower pressure in the smelting furnace and a higher current density in the electrodes.

(*b*) The removal of the furnace gas after it has passed the comparatively thin layer of materials which covers the smelting place. In other words, large shafts for the pre-reduction ought to be avoided.

In large furnaces it is possible to employ a higher voltage than in small furnaces, no matter what the process is, and this applies also to working with coke for the reduction, but the pressure cannot be kept as high as when charcoal is employed. With charcoal it is easy to work with 70 volts per phase, while this figure with coke must be reduced to 50-55 volts per phase. The reason for this is the high conductivity of the coke. It should, however, be observed that the development in this direction is not a closed chapter, and it is thus quite possible and probable that a higher voltage can be employed later on with coke as fuel. For working with coke a greater current density in the electrodes is required on account of the lower voltage and the greater weight of the ore per unit of volume. With charcoal as reducing agent, the density of the current in the electrodes need not exceed 2 to 3 amperes per $cm.^2$, while with coke it should be at least 4, or preferably 5-6 amperes per cm^2. Owing to these circumstances, and in consequence of the unsuitable frequency of the generators at the power station, it became necessary to reduce the load on the Domnarfvet furnace to 5,000-5,500 H.P. when coke was used for the reduction, but with this load the smelting proceeded without any difficulties.

The second condition for the employment of coke is a speedy removal of the gas from the furnace, and the gas should consequently not have to pass through thick layers of materials, as this might lead to explosions.

Bridges and empty spaces are easily formed in a furnace by a material like coke, and this is one of the main reasons why large shafts, filled with charging materials through which the gases must pass, are not to be recommended in connection with coke as reducing agent in large furnaces. If coke is to be used the only shafts permissible are the low ones, so that the gases will have to pass through only a thin layer of materials. This represents in one sense a disadvantage, viz., that the reducing power of the gas is not properly utilised. The gas obtained will be rich in CO, while the consumption of energy and coke, on the other hand, will increase.

With coke the consumption of energy in the large electric furnace has thus been 2,400 KW.-hours per ton of pig-iron (60 per cent. Fe), while that of coke amounted to 310-320 kg., and the consumption of electrodes to the same as with charcoal, viz., 7 kg. per ton of pig-iron.

In order to review the whole situation it is, however, necessary to look into the question of the gas problem. When it is thus, by the employment of coke, not possible to utilise the furnace gas fully in the large furnace itself, there must be found a way for utilising it outside the furnace. It is well known that these gases, which are so rich in CO, can be employed for a pre-reduction of the iron ore in the so-called rotating furnaces, and it should thus be the most natural solution of the problem to connect the large furnaces with rotating furnaces, in which a preparatory reduction of the ore is effected before it reaches the large furnace. This refers to ironworks which are only engaged in the manufacture of electrical pig-iron, and in which there is no other use for the gases.

These can be utilised in the manner described above, and it is obvious that the consumption of energy and of electrodes per ton of pig-iron can thus be reduced considerably. In such works where the electrical pig-iron is going to be employed for the manufacture of steel, the gases can, of course, be used for the heating of the Martin furnaces. This is now being done at Domnarfvet, where the gaspipes from the large electrical furnaces are connected with the steel works. In this way it makes no difference at all in regard to the cost of the finished product of steel, whether a smaller quantity of coke is used in the electric furnace, from which an inferior gas is produced, or there is consumed a larger quantity of coke, which is able to produce a rich and valuable gas for the further treatment of the pig-iron. But the gas problem has also a third side worth looking at, which may be considered to be of just as much importance, although for the time being it will have to stand in the background.

As far as it is known there is no apparatus at the present time which is capable of producing such pure carbon-monoxide as the electrical furnace, and it is produced from the large plants in such quantities, and with such regularity that there ought to be great scope for the utilisation of this excellent material for the synthetic manufacture of organic substances. This gas is really far too good to be used as fuel, and if judged by its purity and by the readiness with which it enters into chemical combination, its real function ought to be to serve the chemical industry. Carbon monoxide represents the connecting link between the electrical pig-iron industry and the chemical industry on a large scale. If pure carbon monoxide be conducted over caustic soda, there will be formed sodium formate which can be easily transformed into oxalic acid, and this is one way of utilising carbon-monoxide. Another possibility for its utilisation is to produce oxymethylene, CH_2O, from which it should not be impossible to produce synthetic sugar. These are chemical problems, which can, of course, be multiplied, but the fact that pure carbon-monoxide can now be obtained from the electric furnace in connection with the production of electrical pig-iron seems to open a very wide field of future possibilities to this industry.

It should also be mentioned that coke produced from peat would represent an excellent material, which would, no doubt, be of vital importance in countries like Norway.

In conclusion, it should be stated that the question of charging will most probably be solved by arranging shafts for the materials around the electrodes. Such an arrangement would allow of an easy and continual charging, and these shafts will not, if coke be used, be employed for the pre-reduction of the ore, as it is the intention to remove the gas through an opening as far down in the furnace as possible.

COSTING.

By "SURPLUS."

An efficient and simple system of costing will no doubt be acknowledged to be an important factor to-day in electrical supply, and, as competition grows keener, those in charge of electrical undertakings will require costs statements more and more analytical, in order that every increased item of expenditure, however slight, may be obvious, and steps may be taken to prevent further increases, if possible ; and, further, that the effect of economies instituted may be plainly seen, as this displayed in £ s. d. is undoubtedly an incentive to all concerned to work with a view of furthering that desirable and necessary result—"efficiency consistent with economy."

The remark has been made that the days of the economist of the coal-heap are over, but economy will still have to be exercised. No doubt in the past the revenue-earning side of electrical supply undertakings was more or less shelved in favour of the operating departments, but this state of affairs exists no longer in up-to-date undertakings. With publicity campaigns, smart advertising, showrooms and canvassing, the revenue-earning side is receiving more than ordinary attention ; but whilst admitting that every attention should be given for the purpose of increasing the number of consumers, we must not lose sight of the fact that the expenditure also merits attention, as, whatever the increase of revenue may be, expenditure is relative to profits, and the cost per unit sold governs the result ; therefore an efficient system of costing is necessary so that the progress of an undertaking can be observed at any time, and not only after the expiration of the financial year.

For this purpose many advocate a card system, and in the case of a manufacturing undertaking, where cards follow the manufacture of an article or a piece of machinery through various departments to the assembling room, it is, no doubt, the up-to-date system; but with regard to the electrical supply industry, this is not necessary, and better results may be obtained by a simple system of works order numbers in conjunction with the use of a loose-leaf ledger. Card-trays, to say the least, are cumbersome, and where they can be dispensed with for account-keeping it is desirable to do so. The loose-leaf ledger answers the same purpose and, moreover, is easily handled, the sheets cannot possibly be mislaid, except wilfully, inasmuch as they are never taken away from their particular location, except when the matter is dead, or the data therein relate to a past period and the accounts for such period are closed, when they are placed in one or other of the makes of mechanical binders for future reference.

The system hereafter described can be made to suit any conditions of supply. It may be thought that the system is too analytical, but it takes very little longer to allocate to 100 accounts than to 50; further exception may be taken to the amount of space used; however, paper is cheap and inefficient records expensive, and further, the system is described minutely in order to show how the accounts can be dissected to a degree if the particular conditions render it necessary or desirable.

Works Order Numbers.—These are arranged as far as possible in the same manner as the Board of Trade returns, so as to facilitate the filling-in on the statutory forms of the necessary information.

A number should be given to each principal account and subsidiary accounts should be numbered as shown :—

WORKING COSTS.

1. *Generating.*
   - Coals ..... 1·1
   - Oils, waste, &c. ..... 1·2
   - Wages ..... 1·3

MAINTENANCE AND REPAIRS TO STATION PLANT.

2. *Boilers.*
   - Boiler No. 1 ..... 2·1
   - " " 2 ..... 2·2
   - " " 3 ..... 2·3
   - " " 4 ..... 2·4
3. *Engines.*
   - ..... 3·1
   - * ..... 3·2
4. *Generators.*
   - * ..... 4·1
5. *Pumps and Pipes.* *
6. *Buildings.* *
7. *Electrical Instruments.* *

DISTRIBUTING CHARGES.

8. *Wages* ..... 8·1
   - * ..... 8·2
9. *Rent, Rates and Taxes.* *
10. *Management Charges.* *
11. *Law Expenses.* *
12. *Insurances.* *
13. *Public Lamps.* *

* Subsidiary accounts added as required, and numbered ·1, ·2, ·3, and so on.

There is no hard-and-fast rule regarding the order of the accounts, and this is only an example; the accounts can be arranged in any manner to suit either Board of Trade requirements or local conditions.

A printed copy of the works order numbers should be handed to all interested, and the various superintendents will mark the pay-sheets, stores orders, &c., with the number relative to the account to be charged.

Wages Accounts.—It is not proposed to deal here with any methods of time-keeping, but purely with account-keeping.

The following is a summary sheet for a week, and for the purpose of simplicity it is proposed to deal with one main account only—viz., maintenance of engines. The wages of drivers, &c., will, of course, be charged to Generating W.O. 1·3.

Fitter John Smith has been doing repairs to turbines Nos. 1, 2 and 3; the time-sheet is therefore as follows :—

TIME SHEET.

Name..... *Week ending* ....., *191*

Day.	Time.	Hours.	W.O.	Description of work.
Thursday ...	6.30			Particulars to be filled in.
	8.30	2	3·1	
	9.0			
	12.0	3	3·2	
	1.0			
	5.30	4½	3·3	
Friday ...				
Saturday ...				
Sunday ...				
Monday ...				
Tuesday ...				
Wednesday ...				
	Total ...			

Certified ....., *Superintendent.*

This time-sheet is self-explanatory, but there yet remains the weekly summary of time chargeable to each particular account. This is dealt with as follows :—A small summary slip gummed at the left-hand edge is affixed to the time-sheet, and the total week's time chargeable to each particular works order is totalled and entered thereon as follows :—

WAGES ANALYSIS. *Date* .....

Hours	Work	W.O.	Rate	Amount		
20	Repairs	3·1	8½		14	2
13	"	3·2	8½		9	2½
20	"	3·3	8½		14	2
53				£1	17	6½

From this analysis slip the time is then entered into the Wages Analysis Book as follows :—

WEEK ENDING ..... 191 .

Name.	Occupation.	Rate.	Generating.		Maintenance and Repairs to Station Plant.										Distributing Charges.				Management.				Public lamps.		Capital		Total Time.	Total Wages.
					Boilers.		Turbines.		Generators.		Pumps and Pipes.		Buildings.		Electrical Instruments.		Distributing.		Sub-stations.		Engineer's Department.		Clerical Staff.							
			W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.	W.O. Time.	Amount.		
J. Smith.	Fitter.	8½					3·1 / 4h	s. d. 14 2																				
							3·2 / 1s	9 2½																				
							3·3 / 2h	14 2																			53	£1 17 6½

At the end of the month it will be necessary to prepare a summary of the total amounts chargeable to the different costs accounts, and the following will be found to be a convenient and neat method. Instead of writing the summary across the analysis rulings, which are not in keeping with the summarised data, a foolscap summary sheet, gummed at the left-hand edge, is inserted opposite the particulars for the last week of the month :—

SUMMARY SHEET.

For Month Ending .....

——	W.O.	£ s. d.	£ s. d.	——	W.O.	£ s. d.	£ s. d.
Generating	1·3		100 0 0				
Maintenance and repairs :							
Boilers	2·1	1 10 0					
,, ...	2·4	2 0 0					
,, ...	2·5	3 10 0					
			7 0 0				
Engines	3·1	3 3 0					
,, ...	3·4	2 0 0					
,, ...	3·5	3 7 0					
(And so on)							

STORES RECEIVED AND ISSUED BOOK.

RECEIVED.

Date	Quantity	Description	From	Invoice book page	Rate		

ISSUED.

Date	Quantity	Description	For	W.O.	Rate			

The stores issued will be entered up weekly from the Stores Issued sheets, all stores against the different works orders being grouped together thus :—

		£ s. d.
250 tons unscreened coal, generating	1·1	.....
25 gallons turbine oil, ,,	1·2	.....
28 lb. waste, ,,	1·2	.....

And so on. At the end of the month a summary sheet should be inserted in the same manner as for the wages analysis.

INVOICE BOOK.

Date	——	—	Details	Capital	Maintenance	Stock	Total

(*To be concluded.*)

"POOCHEES."

BY CHARLES S. JEFFREY, A.M.I.E.E., A.Amer.I.E.E.

THE word "poochee" may not be found in the English dictionary, but it is one which has a distressing significance for every one who has lived in India. It is from Tamil, one of the native languages of Southern India, and means literally "flea." It is, however, used colloquially as an inclusive name for all kinds of flying insects.

The fascination of the candle for the moth is proverbial, but as we in India know to our discomfort, it is not the moth alone which is so attracted. At certain seasons an extraordinary variety of flying insects are drawn in myriads by the high-candle-power lamps which are in vogue now in every town which boasts an electric supply system. Some of these are wonderfully beautiful, others equally hideous. For example, the writer has seen glorious moths 8 in. from tip to tip of the wings. A frequent visitor is a large flying beetle which has a body the size and shape of a walnut, and makes a noise like a synchronous motor out of step. The Memsahib, who is not an admirer of the Government, declares that his facial expression is exactly that of a prominent member of the Liberal Cabinet.

These creatures vary in size from the large ones mentioned to little ones no larger than a pin's point. One exasperated visitor, after an evening of torment, summed up the position feelingly when he declared that this town possessed "the fauna of delirium tremens." Fortunately we rapidly become accustomed to them, and in ordinary circumstances the majority of them do not cause us much inconvenience. Ladies who at home would shudder at the sight of a cockroach, after a few months here are indifferent to their presence on the dining table, and do not dream of rejecting the soup because some flying creature has taken an involuntary bath in it.

There are one or two among these insects, however, which compel attention, notably an odoriferous little beggar known in polite circles as the "smelling beetle," and in other circles by the more eloquent designation of the "stink bug." When one of these gets into the soup the dog will not touch it. When they get into Memsahib's hair one does *not* sing with the poet—

> O loaded curls, release your store
> Of warmth and scent, as once before.

In passing, it may be remarked that that king of pestilential nuisances, the mosquito, does not obey the same laws as most of the other insects. Like the poor, he is always with us. The lamp has no fascination for him; on the contrary, he loves the dark. Whilst the other poor creatures are battering themselves against the lighting fixtures, he lurks under the table and draws sustenance from the ankles of any unwary human who has not provided himself with double hose. The mosquito is receiving a good deal of attention in scientific circles, and for the purposes of this article we are not concerned with him.

When the insects are numerous, travelling in brightly-lighted tramcars is a trying ordeal. Often the conditions are so intolerable that the traffic revenue is seriously affected. Reducing the illumination in the cars is of little use, because they of necessity pass close to the public lighting standards, at each of which there is a dense column of insects. The tramcar acts as a kind of butterfly net and collects numerous samples from each standard. These street arc lamps, by the way, are a source of profit to our Chinese friends, who collect a succulent type of grasshopper, which they are said to find a valuable article of diet.

It is possible to secure protection from these flying insects, and particularly from the mosquito, in the houses by fitting every door and window with fine wire mesh screens. However, in the Tropics, where every breath of wind is valued, people are loath to do anything which will interfere with the ventilation, unless the mosquitoes are present in sufficient numbers to make it imperative.

The cost of making a building mosquito-proof is very considerable. The plan has been suggested, and the writer believes carried into effect, of erecting powerful searchlights, close to which are placed large exhaust fans. These fans draw all the insects which collect round the searchlights into a receiver, from which they are removed periodically and used as manure. This also is financially out of the question.

It is well known here that by using ruby globes, or covering the lamps with red fabric, the number of insects attracted is very much reduced, and this is the plan which is usually resorted to. It is known that the eyes and ears of certain insects are not sensitive to colours and sounds over the same range as human beings, and it has been suggested to the writer that the efficiency of the red lamp is due to this

fact. In the ordinary incandescent lamp the red rays do not constitute a very large percentage of the total light, and for this reason it is most uneconomical to use a red screen.

The only electric lamp known to the writer which is rich in red rays is the "Neon" lamp (described in a lecture delivered by the inventor, M. Georges Claude, at a joint meeting in Paris of the Institution of Electrical Engineers with the Société Internationale des Electriciens in May, 1913, and published in the *Journal* of the former Institution in October, 1913), and he has suggested to the manufacturers the desirability of experimenting with it in this connection. In the form in which it is at present made this lamp is not adapted for house lighting, but if the manufacturers realise that there is a market for it, it may be possible suitably to modify it. That there is a market for an efficient red lamp is evident from the number of houses in which the inefficient combination of metallic-filament lamp and red shade is in use.

It may be that the red ray is not the only one to which the insects are insensitive, and that a fuller investigation may reveal some other form of lighting which is equally efficacious.

NEW PATENTS APPLIED FOR, 1914.

(NOT YET PUBLISHED).

Compiled expressly for this journal by Messrs. W. P. Thompson & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

18,991. "Electric cooking apparatus." W. P. Perry. August 24th.

19,005. "Electrically-operated tramway points." L. T. Healey and B. D. Healey. August 24th.

19,013. "Systems of teledynamic control." J. H. Hammond, Jun. August 24th. (Convention date, September 8th, 1913, United States.) Complete.

19,017. "Electric starters for motor-car engines and the like." H. Leitner. August 24th.

19,045. "Telegraphy." W. M. Bruce, Jun., and United Telegraph & Cable Co. August 25th. (Complete.)

19,054. "Receiver for wireless systems." A. J. Roberts. August 25th. (Convention date, August 25th, 1913, Australia.) Complete.

19,057. "Speed-controlling devices for electric motors." British Thomson-Houston Co., Ltd. (General Electric Co., United States). August 25th.

19,078. "Electric cooking apparatus." W. P. Perry. August 26th. (Complete.)

19,110. "Electrical control of railway traffic and the like." H. H. Dyer. August 27th.

19,121. "Electrical continuity of electrical conduits and other tubes." R. W. Perry. August 27th.

19,122. "Electric switch-boards." C. H. Worsnop. August 27th.

19,150. "Anode supports for use in the electro-deposition of metals." S. O. Cowper-Coles. August 27th.

19,151. "Flux for soldering zinc surfaces." S. O. Cowper-Coles. August 27th.

19,152. "Process for obtaining adhesive deposits of lead upon iron and steel surfaces." S. O. Cowper-Coles. August 27th.

19,184. "Electric mains and the like." W. B. Woodhouse. August 28th.

19,191. "Lamp holder." St. Helen's Cable & Rubber Co., Ltd., and J. C. White. August 28th.

19,192. "Wall junction boxes for electric cables." J. C. White and St. Helen's Cable & Rubber Co., Ltd. August 28th. (Addition to 22,198/13.) Complete.

19,197. "Boxes or containers for electric batteries, chi fly designed for use on automobile vehicles and in like positions." F. H. Bluemel & Bluemel Bros., Ltd. August 28th.

19,198. "Electro-magnetic brake system for feed-reels and the like." H. V. James. August 28th.

19,232. "Iron alloy of low hysteresis and method of producing the same." S. O. Cowper-Coles. August 29th.

19,237. "Mechanism for printing-telegraph systems." E. C. R. Marks. (Morkrum Co., United States.) August 29th. (Complete.)

19,238. "Electro-magnetic track brake." Diedrich Storjohann. August 29th. (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of the specifications in the following list may be obtained of Messrs. W. P. Thompson & Co., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1913.

15,633. Engine Starting Systems for Automobiles. A. E. White (Dayton Engineering Laboratories Co.). July 7th.

16,040. Supply of Electricity for Heating, Lighting, and other purposes. A. F. Berry. July 11th. (Cognate application 26,494/13.)

18,008. Train Electric Control Systems. B. Starie. August 7th.

18,019. Automatic Signalling and Alarm Systems for Railways and the like. O. M. de Munnick. August 7th.

18,170. Cables for the Transmission of Electric Energy. J. G. Cunliffe and R. G. Cunliffe. August 9th.

18,592. Transformers for High-frequency Currents. J. Marconi and W. S. Entwistle. August 14th.

18,765. Oscillatory Electro-dynamic Apparatus for Submarine Signalling and other purposes. R. A. Fessenden. August 18th. (January 29th, 1913.)

19,966. Method and Apparatus for the Transmission of Messages or Designs such as Photographs, Cliches and the like. W. P. Thompson (Soc. Anon. des Telegraphes Edouard Belin). September 4th.

21,036. Telegraphic Receiving Apparatus. J. Gell. September 17th.

21,646. Electric Joint and Apparatus therefor. C. J. Beaver and E. A. Claremont. September 25th.

22,419. Lighting Systems. O. H. Mohr. October 4th. (October 5th, 1912.)

22,421. Resinous Condensation Products. British Thomson-Houston Co. (General Electric Co.) October 4th. (Addition to 24,254/12.)

22,782. Bells or Gongs. R. Nicholas. October 9th.

24,074. Automatic Safety Shunting-devices for Electric Arc Lamps. A. H. Railing and A. E. Angold. October 24th.

24,569. Porous Containers or Diaphragms for Voltaic Cells. J. G. Lucas. October 29th.

24,594. Electric Switches or Circuit Breakers. F. B. Holt and H. Smith. October 29th.

25,846. Apparatus for converting Alternating into Direct Current. H. Wade (D. A. Heyman). November 11th.

26,252. Apparatus for Perforating Strips in Dot-and-dash Codes or the like. C. F. Casella & Co., and R. M. Abraham. November 15th.

27,182. Electric Switches, Fuses and the like. British Thomson-Houston Co., and E. B. Wedmore. November 25th.

28,075. Electric-fuse Holders. H. W. Young. December 5th.

1914.

66. Electrical Apparatus for imparting Intermittent Motion at Predetermined Intervals. A. C. Banfield. January 1st.

597. Equipment for Producing Welded Seams by means of the Electric Arc and added Welding Material. F. W. Heuser. January 8th. (July 29th, 1913.)

2,628. Spark-Plugs. P. T. Campbell. January 31st. (January 31st, 1913.)

3,149. Electrical Regulators. F. W. Merrill. February 6th.

3,699. Electro-Magnetic Relays. Western Electric Co. (Woodward, acting for Western Electric Co.) February 12th.

3,919. Starting and Lighting Devices for Motor Vehicles. Willocq Regnault et Cie. (November 5th, 1913.) February 14th.

4,619. Telephone System. P. Lavery & W. E. Bandlow. February 23rd. (February 24th, 1913.)

4,822. Method of Fixing and Preserving Metal Fence-posts, Telegraph Posts and the like driven into the ground, and devices therefor. C. A. Denis. February 24th.

5,247. Systems for the Transmission of Electrical Energy. T. Shaw. February 28th. (February 28th, 1913.)

5,640. Telephone Instruments. Compagnie Francaise Pour L'Exploitation des Procedes Thomson-Houston. March 5th. (April 4th, 1913.)

6,352. Vapour Electric Devices. E. Weintraub. March 12th. (March 13th, 1913.)

7,201. Electrical Connection for Electric Relays. C. Stille. March 21st.

8,807. Supports for Electric Lamps. C. A. Schaefer. April 7th. (January 2nd, 1914.)

10,082. Safety-devices for Electric Circuits. Siemens-Schuckertwerke Ges. April 23rd. (May 3rd, 1913.)

10,794. Duplex Telegraphy. F. Ryan & The Eastern Telegraph Co. May 1st.

14,119. Electric Accumulators. A. Dinin. June 11th.

14,686. Construction of Electric Pocket-lamp, Dry Batteries and Outer Shell or Case containing the aforementioned Dry Batteries. J. S. Hamilton. June 18th. (Divided application on 3,643/14. February 12th.)

Natal Contracts and Public Tendering.—Amended regulations relating to tenders and contracts for the provincial administration of Natal came into force on August 1st. Under these rules, subject to certain reservations, all public works exceeding £250 in value, all new supplies and services exceeding £100, and all recurrent supplies and services exceeding £50 in value in any financial year are to be put up to public tender. The text of the regulations may be seen by United Kingdom manufacturers and contractors at the Commercial Intelligence Branch of the Board of Trade, in London.

Electric Annealing Furnace for Brass and German Silver Ware.—A recent issue of our American contemporary, *Metallurgical and Chemical Engineering*, describes an electric interheating furnace for annealing brass and German silver flatware blanks which has recently been installed by a well-known maker of plated goods at Niagara Falls. The furnace measures 15 ft. × 8 ft. × 7 ft. 6 in. high, and has doors at both ends.

A mechanical pusher operated by compressed air is located at the charging end, the material being packed in steel pans 20 in. sq., which are pushed through one after the other, seven pans being in the furnace at once. The pans are supported on cast-iron grids while in the furnace, and when discharged are automatically dumped into a water-sealed discharge hood, the metal falling into a tank of water or pickling solution, while the pan is caught, held suspended, and may be removed from under the water-sealed hood.

The compressed-air operation of the furnace is largely automatic; the front and rear doors open simultaneously to admit the new charge and release the original charge; as the automatic pan dumping mechanism operates, the pusher recedes from the charging side of the furnace and both doors close.

The dumped material falls into a perforated copper basket for removal; it is not exposed to the atmosphere at any time after entering the furnace until cold, and this eliminates possibility of oxidisation.

The electrical equipment consists of a special 200-K.V.A. transformer, with 12 voltage taps, connected to a special controller, and arranged to give very fine voltage regulation. A Weston wattmeter and a Foxboro pyrometer are provided, the latter connected up with a 48-in. couple placed directly over the pan about to be pushed out of the furnace.

The use of this furnace has demonstrated clearly the superiority of continuous electric furnaces for the class of work handled, as the exact temperature requirements can be met, and the risk of oxidisation is *nil*.

The plant was installed by the Electric Furnace Co., of America.